NTS Educators Teachers Guide

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Science (MCQs)

1. Classification of Living Organisms

- There are given four options for each question. Choose the most suitable out of them:

1. **Micro-organisms are:**
   (A) Very small ✓ (B) Very big
   (C) Both (a) and (b) (D) Nome
2. **Paramecium is example of:**
   (A) Virus (B) Bacteria
   (C) Unicellular ✓ (D) Multi-cellular
3. **Viruses are considered in:**
   (A) Living things (B) Non-living things
   (C) Multicultural (D) Between living and non-living things✓
4. **Why viruses are considered living things?**
   (A) Because they reproduce✓ (B) Because they are found in the form of crystals
   (C) Because they move (D) Because they breath
5. **Viruses are considered as dead due to:**
   (A) Their reproduction (B) Their crystallization✓
   (C) Their motion (D) Their respiration
6. **micro means:**
   (A) Big (B) Small✓
   (C) Tall (D) Huge
7. **Organism means:**
   (A) Living things✓ (B) Non-living things
   (C) Living or non-living things (D) Dead bodies
8. **Micro-organisms can be seen by:**
   (A) Naked eye (B) Telescope
   (C) Microscope ✓ (D) Lens
9. **Virus is the word of language:**
   (A) English (B) Roman
   (C) Greek (D) Latin✓
10. **"virus" means:**
    (A) Disease (B) Poison ✓
    (C) Death (D) Life
11. **Viruses are:**
    (A) Unicellular (B) Multi-cellular
    (C) Cellular (D) Non-cellular✓
12. **Bacteria are:**
    (A) Unicellular✓ (B) Multi-cellular
    (C) Cellular (D) Non-cellular
13. **Some bacteria are:**
    (A) Parasites (B) Heterotrophs
    (C) Autographs✓ (D) None of these
14. **Heterotrophs are the organisms that can:**
    (A) Prepare their own food (B) Live on other organisms
    (C) Not prepare their food✓ (D) Not live on other organisms
15. **Atrophy are the organisms that can:**
    (A) Prepare their own food✓ (B) Not prepare their food
    (C) Live on other organisms (D) Not live on other organisms
16. **Parasites are the organisms that**
    (A) Prepare their own food (B) Live on other organisms✓

(C) Do not prepare their food (D) Do not live other organisms

17. **Viruses can be studies with:**
(A) Microscope (B) Electron Microscope
(C) Biochemical Test **(D) Both (b) and (c) ✓**

18. **All viruses are:**
(A) Heterotrophs (B) Autographs
(C) Parasites✓ (D) All of these

19. **All viruses are:**
(A) Beneficial **(B) Harmful✓**
(C) Some viruses cause diseases (D) No viruses cause diseases

20. **Viruses are harmful for:**
(A) Man (B) Animals
(C) Plant **(D) All✓**

21. **SARS is the disease caused by:**
(A) Virus✓ (B) Bacteria
(C) Amoeba (D) Paramecium

22. **SARS causes harm in:**
(A) Plants **(B) Humans✓**
(C) Animals (D) All

23. **Virus consist of parts:**
(A) 2✓ (B) 3
(C) 4 (D) 5

24. **Coat is the part of virus:**
(A) Inner **(B) Outer✓**
(C) Middle (D) Bottom

25. **Core is the part of virus:**
(A) Inner✓ (B) Outer
(C) Middle (D) Bottom

26. **Bacteria are found in:**
(A) Air (B) Water
(C) Land **(D) All of these✓**

27. **Outer part of a bacterium's body is:**
(A) Cell membrane (B) Cytoplasm
(C) Nucleus **(D) Cell wall✓**

28. **Bacteria move with the help of:**
(A) Flagellum✓ (B) Slime capsule
(C) Cytoplasm (D) Cell wall

29. **All bacteria are:**
(A) Autographs (B) Heterotrophs
(C) Parasites **(D) None of these✓**

30. **All bacteria are harmful:**
(A) Yes **(B) No✓**
(C) Can say (D) Cannot say

31. **Bacteria are also beneficial:**
(A) Yes✓ (B) No
(C) Can say (D) Cannot say

32. **T.B. is the disease which is caused by:**
(A) Viruses (B) Amoeba
(C) Bacteria✓ (D) Paramecium

33. **T.B. is a disease:**
(A) Plants (B) Animals
(C) Humans **(D) Both (b) & (c) ✓**

34. **Plague, Pneumonia, Typhoid, Cholera are caused by:**
(A) Bacteria✓ (B) Virus
(C) Paramecium (D) Amoeba

35. **Canker is a disease caused in:**
(A) Animals **(B) Plants✓**
(C) Humans (D) All of these

36. **Bacteria are:**
(A) More beneficial than harmful✓ (B) More harmful than beneficial
(C) None of these (D) All of these

37. **A group of closely resembling organisms that can breed with on another in nature is called:**
(A) Population (B) Community
(C) Species✓ (D) Living organisms

38. **Those bacteria which cause disease in plants and animals are called:**
(A) Hygenic bacteria (B) Pathogenic bacteria
(C) Parasitic bacteria (D) Autotrophic bacteria

39. **A disease caused by bacteria is:**
(A) Aids (B) Measles✓

(C) Small Pox (D) Cholera

40. At what °C food is heated in sterilization?
(A) 86 - 90 (B) 96 - 100
(C) 106 - 110 (D) 120 - 126✓

41. Chlorine gas is used in the home water supply system during rainy season to kill the micro-organisms:
(A) Algae (B) Bacteria
(C) Fungi (D) Virus✓

42. The micro-organism which is not cellular is:
(A) Algae (B) Bacteria
(C) Fungi (D) Virus✓

43. The disease that can transfer to the next generation is:
(A) Cholera (B) Hemophilia✓
(C) Influenza (D) Malaria

44. Bacteria cause "fibre blight" in:
(A) Apple and orange (B) Apple and peach ✓
(C) Pear and lemon (D) Apple and potato

45. All living and non-living make:
(A) Habitats✓ (B) Community
(C) Population (D) Environment

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2. Plant Kingdom

1. Flowers are of types:
(A) 2✓ (B) 3
(C) 4 (D) 5

2. The simplest group of plant kingdom is:
(A) Fungi (B) Algae✓
(C) Mosses (D) Ferns

3. Algae are structurally:
(A) Cellular (B) Unicellular
(C) Multi-cellular (D) Both (b) & (c)✓

4. Algae are:
(A) Heterotrophs (B) Autotrophs✓
(C) Parasites (D) All of these

5. Thread like structures of fungi are called:
(A) Pores (B) Flagella
(C) Hyphae✓ (D) Tentacles

6. Fungi are:
(A) Autotrophs (B) Heterotrophs✓
(C) Both (D) None

7. Penicillin is obtained from:
(A) Algae (B) Fungi✓
(C) Mosses (D) Conifers

8. Rust and smut diseases are caused by:
(A) Algae (B) Fungi✓
(C) Mosses (D) Ferns

9. Mushroom is the example of:
(A) Fungi✓ (B) Algae
(C) Coniferns (D) Ferns

10. Vascular tissues are used for conduction of:
(A) Food (B) Water
(C) Salt (D) All of these

11. They have well developed roots:
(A) Mosses (B) Algae
(C) Ferns✓ (D) Fungi

12. They have strong stenis and branches:
(A) Conifers✓ (B) Mosses
(C) Ferns (D) Fungi

13. These are called the evergreen plants:
(A) Ferns (B) Conifers✓
(C) Fungi (D) Mosses

14. Flowering plants are the:
(A) Vascular plants✓ (B) Non-vascular plants
(C) Both of these (D) None of these

15. Monocots have cotyledons in their seed:
(A) One✓ (B) Two
(C) Three (D) Four

16. Dicots have cotyledons in their seeds.
(A) One (B) Two✓
(C) Three (D) Four

17. Rose is an example of:
(A) Dicot✓ (B) Monocot
(C) Both (D) None

18. Wheat, maize and rice are:
(A) Flowering plants✓ (B) Non-Flowering

(C) Both of these (D) None of these plants

19. The organisms that prepare their own food by photosynthesis are called:
(A) Heterotrophs (B) **Autotrophs✓**
(C) Parasites (D) All of these

20. Organisms which get their food from other living organisms and dead bodies are called:
(A) Parasites (B) Autotrophs
(C) **Heterotrophs✓** (D) None of these

21. Photosynthesis is found in:
(A) Animals (B) **Plants✓**
(C) Non living (D) All of these

22. The plants have the green co lour due to:
(A) **Co lour due to✓** (B) Chloroplast
(C) Cytoplasm (D) Xylem tissue

23. Organisms responsible for breaking down of dead bodies of plants and animals into simple chemical substances are called:
(A) Vascular Tissues (B) Fungi
(C) Mushrooms (D) **Decomposers✓**

24. Plants in which seeds are not present in their fruits are called:
(A) **Conifers✓** (B) Ferns
(C) Mosses (D) Fungi

25. Plants which do not produce fruits and seeds are called:
(A) Conifers (B) **Ferns✓**
(C) Fungi (D) Mosses

26. Which is included in non flowering plants:
(A) Dicots (B) Mono cots
(C) **Fungi✓** (D) Maizw

27. In which process plants use can bon dioxide:
(A) Movement (B) Circulation
(C) Photosynthesis (D) **Respirations✓**

28. Which is not a parasite:
(A) **Mosquito✓** (B) Fungi
(C) Non-green plant (D) Hook worm

29. The group of dicotyledom plants is:
(A) Apple, pea, maize (B) **Pea, rice, orange✓**
(C) Rice, apple, sarson (D) Wheat, mango, sugar cane

30. Confers are the plants which have:
(A) Cones and small leaves (B) **Naked seeds and needle leaves✓**
(C) Naked seeds but no leaves (D) Seeds and flowers

31. In order to make their own food, plants leaves obsord:
(A) **Minerals✓** (B) Oxygen
(C) Rain (D) Sunlight

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3. Animal Kingdom

1. Invertebrates are the animals that have
(A) Vertebral (B) **No vertebral column✓**
(C) Some have (D) Some do not have

2. Invertebrate have been divided into groups:
(A) 5 (B) **7✓**
(C) 9 (D) 10

3. Vertebral column is:
(A) Skull (B) Structure
(C) **Backbone✓** (D) Spinal chord

4. Animals have been classified into major groups:
(A) **2✓** (B) 5
(C) 7 (D) 9

5. Animals are classified into groups and sub-groups due to their:
(A) Structure (B) Races
(C) Behaviors (D) **Characteristics✓**

6. Amoeba is the example of:
(A) Sponges (B) **Unicellular animals✓**
(C) Worms (D) Shelled animals

7. Paramecium belongs to the group:

(A) Unicellular✓ (B) Worms
(C) Sponges (D) Shelled animals

8. Sponges have in their bodies:
(A) Stings (B) Thorns
(C) Pores✓ (D) Spots

9. Sponges are:
(A) Cellular (B) Unicellular
(C) Multicolor✓ (D) Non-cellular

10. Sponges get food and oxygen through:
(A) Flagella (B) Pores
(C) Gills (D) Cavities✓

11. Majority of sponges are found in:
(A) Rivers (B) Seas✓
(C) Laves (D) Ponds

12. Sycon is the example of:
(A) Unicellular animals (B) Worms
(C) Sponges✓ (D) Shelled animals

13. The body cells of jelly fishes and corals are arranged into layers:
(A) 2✓ (B) 3
(C) 4 (D) 5

14. The thread-like structures of jelly fishes are called:
(A) Tentacles✓ (B) Flagella
(C) Pores (D) Spines

15. Tentacles are used for:
(A) Moving (B) Berating
(C) Capturing✓ (D) Hunting

16. In corals, skeleton consists of:
(A) Protein (B) Calcium✓
(C) Fat (D) Shell

17. The largest coral reef of the world is in:
(A) Philippines (B) Britain
(C) Argentina (D) Australia✓

18. "Great Barrier" is the largest coral reef of the world Its length is:
(A) 500 Km (B) 1000 Km
(C) 2000 Km✓ (D) 5000 Km

19. Most of the worms are:
(A) Parasites✓ (B) Autographs
(C) Heterotopy (D) None of these

20. Flatworms live in the organs of animals and humans:
(A) Stomach (B) Liver
(C) Intestine (D) Both (b) & (c)✓

21. Segmented worms have no special organs for:
(A) Motion (B) Excretion
(C) Respiration✓ (D) Reproduction

22. Segmented worms take breath through their:
(A) Mouth (B) Nose
(C) Moist Skin✓ (D) Head

23. Animals with jointed legs have pairs of legs:
(A) Three✓ (B) Two
(C) Four (D) One

24. Animals with jointed legs have pairs of wings:
(A) One (B) Two✓
(C) Three (D) Four

25. Shelled animals live in:
(A) Soil (B) Water
(C) Air (D) Shell✓

26. Housefly and butterfly are the example of:
(A) Shelled animals (B) Worms
(C) Animals with jointed legs✓ (D) Sponges

27. Snail is an animals of group:
(A) Shelled animals ✓ (B) Worms
(C) Jelly fishes and corals (D) Spiny animals

28. Muscular foot in the shelled animals is used for:
(A) Respiration (B) Locomotion✓
(C) Reproduction (D) Motion

29. Shell of the shelled animals is made up of:
(A) Calcium✓ (B) Protein
(C) Vitamin (D) Carbon

30. Spiny animals have on their bodies:

(A) Pores (B) Shells
(C) Spots (D) Spines✓

31. **Star fish is the example of:**
(A) Jelly fish and corals (B) Animals with jointed Legs
(C) Shelled animals (D) Spiny animals✓

32. **Vertebrates are the animals that have in their bodies:**
(A) Structure (B) Skull
(C) Backbone✓ (D) Skins

33. **Vertebral are divided into groups:**
(A) 2 (B) 3
(C) 4 (D) 5✓

34. **Body of the animals with jointed legs has parts:**
(A) One (B) Two
(C) Three✓ (D) Four

35. **The fore part of the animals with jointed legs is;**
(A) Mouth (B) Head✓
(C) Thorax (D) Abdomen

36. **The middle part of the animals with jointed legs is:**
(A) Head (B) Mouth
(C) Thorax✓ (D) Abdomen

37. **The hind (back) part of the animals with jointed legs is:**
(A) Head (B) Mouth✓
(C) Thorax (D) Abdomen

38. **Fishes have parts of their body:**
(A) 1 (B) 2
(C) 3✓ (D) 5

39. **The body of the fishes consists of:**
(A) Head (B) Trunk
(C) Tail (D) All of these✓

40. **Fins of the fishes help then in:**
(A) Reproduction (B) Moving
(C) Swimming✓ (D) Eating

41. **Gills help fishes:**
(A) Respiration✓ (B) Reproduction
(C) Hunting (D) Moving

42. **Group of animals whose body temperature changes according to the environment are called:**
(A) Warm blooded (B) Cold blooded✓
(C) Amphibians (D) Reptiles

43. **Groups of animals whose body temperature does not Change according to the environment are called:**
(A) Warm blooded✓ (B) Cold blooded
(C) Amphibians (D) Reptiles

44. **The amphibians can live in:**
(A) Water (B) Land
(C) Ice (D) (a) & (b)✓

45. **Mammals which have pouch are called:**
(A) Mammals (B) Pouched Mammals✓
(C) Placental Mammals (D) Egg-laying Mammals

46. **Which is a unicellular animals:**
(A) Flat worm (B) Amoeba✓
(C) Round worm (D) Tape worm

47. **A group of warm blooded animals is:**
(A) Mammals and birds✓ (B) Fishes and mammals
(C) Fishes and birds (D) Fishes and reptiles

48. **The body of insects consists of:**
(A) Head (B) Throat
(C) Abdomen (D) All these✓

49. **Fishes breath through:**
(A) Lungs (B) Nostrils
(C) Skin (D) Gills✓

50. **Amphibians are:**
(A) Cold blooded animals✓ (B) Warm blooded animals
(C) Both of these (D) None these

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4. Environment

1. **The production of organisms in an area remains:**
   (A) Same (B) Varying✓
   (C) Static (D) Constant
2. **It the birth rate in population of an area is more than the death rate, it shows:**
   (A) Increase in population✓ (B) Decrease in population
   (C) Both of these (D) None of these
3. **It the birth rate in population of an area is lesser than the death rate, it shows:**
   (A) Increase in population (B) Decrease in population✓
   (C) Both of these (D) None of these
4. **Climatic conditions play role in bringing changes in the population:**
   (A) Important✓ (B) No role
   (C) Unimportant (D) All of these
5. **Diseases and epidemics do with population increase:**
   (A) Encourage (B) Discourage✓
   (C) Eliminate (D) Harm
6. **In the fourteenth century, which disease washed half of the population of England within 31 years:**
   (A) Cholera (B) Cancer
   (C) AIDS (D) Plague✓
7. **Plague epedic washed the% of the total population of Asia and Central Europe:**
   (A) 25%✓ (B) 50%
   (C) 60% (D) 70%
8. **Beth health facilities and favorable climatic conditions put effect over population increase:**
   (A) Discouraging (B) Encouraging✓
   (C) Harmful (D) None of these
9. **All members of a species living in an area is called:**
   (A) Community (B) Generation
   (C) Diversity (D) Population✓
10. **Population living and interacting in an area is called:**
   (A) Colony (B) Generation
   (C) Community✓ (D) Diversity
11. **The condition when population exceeds the carrying capacity of an ecosystem is called:**
   (A) Under control population (B) Over-population✓
   (C) Unemployment (D) Rapidity
12. **The number of individuals of species whose need can be fulfilled by the ecosystem is called:**
   (A) Biodiversity (B) Diversity
   (C) Carrying capacity✓ (D) Rapidity
13. **Variety organisms is called:**
   (A) Adversity (B) Community
   (C) Biodiversity✓ (D) Rapidity
14. **Cutting of trees and destruction of forests due to human activities is named:**
   (A) Plantation (B) Deforestation✓
   (C) Flowering (D) Environmentalism
15. **Reusing and rendering of used articles into useful ones is called:**
   (A) Reusability (B) Productivity
   (C) Usability (D) Recycling✓
16. **Shifting of population to or from one place is called:**
   (A) Over-population (B) Administration
   (C) Migration✓ (D) Diversity
17. **Lack and deficiency of eatables in an area; this situation is called:**
   (A) Epidemics (B) Diseases
   (C) Migration (D) Famines✓
18. **Affects the population increase:**
   (A) Climate✓ (B) Unemployment
   (C) Economy (D) Education
19. **In the mid seventeenth century, the population of the world was:**
   (A) 300 million (B) 500 million ✓
   (C) 600 million (D) 700 million
20. **At present, the population of the world has surpassed:**

(A) 6 billion✓ (B) 7 billion
(C) 8 billion (D) 5.5 billion

21. A resource that does not regenerate quickly is called:
(A) Renewable resource (B) Non-renewable resource✓
(C) Reusable resource (D) Recycling resource

22. The setting up of Industries is called:
(A) Forestation (B) Resource depletion
(C) Industrialization✓ (D) Urbanization

23. The migration of population from villages to the cities is called:
(A) Colonalization (B) Urbanization✓
(C) Over-population (D) Industrialization

24. Cultivation process of farms is called:
(A) Industry (B) Urbanizing
(C) Farming✓ (D) Plantation

25. Mechanized farming is done in the countries:
(A) Third world (B) Developed and advanced✓
(C) Under-developed (D) Backward

26. Cutting and getting destroyed land in called:
(A) Soil erosion✓ (B) Deforestation
(C) Farming (D) Water-logging

27. The phenomenon in which temperature affects environment is called:
(A) Globalization (B) Green house effect✓
(C) Industrialization (D) Urbanization

28. Rising of temperature of the earth due to the green house effect is called:
(A) Globalization (B) Industrialization
(C) Global warming✓ (D) Environmental pollution

29. Ozone is a:
(A) Solid (B) Liquid
(C) Layer (D) Gas✓

30. Ozone is to the earth:
(A) Harmful (B) Beneficial✓
(C) Both of these (D) None of these

31. Environmental pollution reacts ozone layer:
(A) Beneficially (B) Harmfully✓
(C) Both of these (D) None of these

32. Ozone is protecting the earth from:
(A) Moonlight (B) Sunlight
(C) Ultra-violet radiations✓ (D) Starlight

33. The adverse conditions of environment which cause harmful effects on the life on the earth is called:
(A) Environmental pollution (B) Environmental degradation✓
(C) Deforestation (D) Ozone depletion

34. Ultra-violet radiations are released from:
(A) Stars (B) Planets
(C) Sun✓ (D) Moon

35. Ultra-violet radiations are harmful for:
(A) Humans✓ (B) Animals
(C) Plants (D) All of these

36. Ultra-violet radiations cause diseases:
(A) T.B. (B) Cancer✓
(C) Cholera (D) AIDS

37. According to experts, on how much % area of a country should be forests:
(A) 10 (B) 15
(C) 20 (D) 25✓

38. Pollution is caused by oxides of:
(A) Sodium (B) Hydrogen
(C) Florin (D) Sulphur✓

39. The depletion of ozone layer is happening in the atmosphere due to:
(A) Less industrialization (B) Excessive industrialization
(C) Excessive plantation (D) Excessive use of pesticides

40. The presence of excessive mixture of different gases in the air creates:
(A) Environmental (B) Weather

degradation changes
(C) Green house effect (D) **Global warming✓**

41. **The basic cause of environmental degradation are:**
(A) Floods (B) **Human activities✓**
(C) Water pollution (D) Forestation

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5. Continuity of Life

1. **The process of transfer of character's from parents to their offspring is called:**
(A) DNA (B) **Heredity✓**
(C) RNA (D) Genetics

2. **The characteristic which are inherited are called:**
(A) Parental Characteristics (B) Maternal Characteristics
(C) **Hereditary Characters✓** (D) Genetic Characters

3. **Units controlling inheritance and expression of characters are called:**
(A) Heredity (B) **Genes✓**
(C) Habits (D) Behaviors

4. **Hereditary material of the cell is called:**
(A) **DNA✓** (B) RNA
(C) Heredity (D) Habit

5. **The technology using breeding of selected organisms is called:**
(A) Biotechnology (B) Genetic breeding
(C) **Selective breeding✓** (D) Genetic engineering

6. **Manipulation of genes for human welfare:**
(A) **Genetic engineering✓** (B) Selective breeding
(C) Biotechnology (D) Genetic breeding

7. **Industrial use of organisms for human welfare is called:**
(A) Hereditary characters (B) Selective breeding
(C) Genetic engineering (D) **Biotechnology✓**

8. **Hereditary Characters are transmitted to the offspring from:**
(A) Father (B) Mother
(C) **Parents✓** (D) None of these

9. **Differences among members of a family or species are called:**
(A) Similarities (B) **Variations✓**
(C) Heredity (D) Transformations

10. **The nucleus of the cell contains thread like structures which are called:**
(A) Chloroplast (B) Genetics
(C) Cytoplasm (D) **Chromosomes✓**

11. **The characteristics are transmitted to the gew generation which determines them:**
(A) RNA (B) **DNA✓**
(C) Proteins (D) Genetics

12. **The telegram code is called:**
(A) Genetic code (B) Genetics
(C) **Morse code✓** (D) DNA

13. **The telegram code is expressed by:**
(A) Alphabets (B) Symbols
(C) Motions (D) **Signals✓**

14. **Instruction for inheritance of characters are present in the form of :**
(A) RNA (B) Morse code
(C) **Genetic code✓** (D) Hereditary code

15. **The defects inherited by genes and DNA are:**
(A) Hemophilia (B) Thalassemia
(C) **Both (a) & (b) ✓** (D) None of these

16. **Broiler chickens are developed through the technique:**
(A) Genetic engineering (B) **Selective breeding✓**
(C) Biotechnology (D) Heredity

17. **Through selective breeding we have characteristics of our:**

(A) Choice✓ (B) Merit
(C) Quality (D) Genes

18. **Animals and plants having different characters of two parent varieties are called:**
(A) Genesis (B) Biodiversity
(C) **Hybrids✓** (D) Biotechnology

19. **The process of cross-breeding to get different characters is called:**
(A) **Hybridization✓** (B) Biodiversity
(C) Selective breeding (D) Biotechnology

20. **Shiwal cow, Neely Rave buffalo and Taddy goat are the example of:**
(A) Genetic engineering (B) Selective breeding
(C) **Hybridization✓** (D) Biotechnology

21. **Fermentation is a common example of:**
(A) Genetic engineering (B) **Biotechnology✓**
(C) Selective breeding (D) Hybridization

22. **Yogurt, breed and cheese are produced by:**
(A) Hybridization process (B) Biotechnology process
(C) Selective breeding (D) **Fermentation✓**

23. **Which bacteria cause production of yogurt:**
(A) **Yeast✓** (B) Unicellular
(C) Multi-cellular (D) Cellular

24. **Tissue culture us an example of:**
(A) Genetic engineering (B) Selective breeding
(C) **Biotechnology✓** (D) Hybridization

25. **Asexual breeding or vegetative propagation on like stem cutting is called:**
(A) Biotechnology (B) **Tissue culture✓**
(C) Hybridization (D) Fermentation

Sugar cane crop is developed by the technique:
(A) Tissue culture✓ (B) Biotechnology
(C) Fermentation (D) Hybridization

27. **A substance that protects the body against cancer is:**
(A) Insulin (B) Inferno
(C) **Interferon✓** (D) Penicillin

28. **The disease-free crop in Pakistan produced is:**
(A) Wheat (B) **Sugar cane✓**
(C) Maize (D) Gram

29. **The organism that receives and incorporates foreign DNA into its DNA is called:**
(A) **Transgenic organism✓** (B) Micro-organism
(C) Harmful organism (D) Hereditary organism

30. **Insulin is used to protect and treat the disease:**
(A) T.B. (B) **Diabetes✓**
(C) Cancer (D) Tetanus

31. **Instruction for inheritance is give by:**
(A) RNA (B) Genesis
(C) **DNA✓** (D) Heredity

32. **Unit of inheritance is called:**
(A) **DNA✓** (B) Chromosomes
(C) Genes (D) RNA

33. **Broilers and layers are produced by using the technique of:**
(A) Genetic engineering (B) **Selective breeding✓**
(C) Cloning (D) Transformation

34. **Chromosomes are chemically composed of DNA and:**
(A) Carbohydrates (B) Fats
(C) **Proteins✓** (D) Vitamins

35. **Offspring possess many characters similar to their parents because of:**
(A) Adaptation (B) Cytoplasm
(C) Variations (D) **Inheritance✓**

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6. Symbols and Formulae

1. The short name of the element is called:
   (A) Formula (B) Symbol✓
   (C) Radical (D) Valency
2. Symbolic representation of an element or compound which is the collection of symbols is called:
   (A) Radical (B) Chemical formula✓
   (C) Symbolic formula (D) Valency
3. A compound is denoted by:
   (A) Chemical formula✓ (B) Symbol
   (C) Valency (D) Composition
4. The plural of formula is:
   (A) Formula (B) Formulae✓
   (C) Formulas (D) All off these
5. An atom or group of atoms which keep its identity during chemical reaction is called:
   (A) Chemical (B) Valency
   (C) Radical✓ (D) Symbol
6. The compound which is formed by the chemical combination positive and negative ions is called:
   (A) Ionic compound✓ (B) Valency
   (C) Chemical compound (D) Radical
7. The capacity of an element to chemically combine with the number of hydrogen or chlorine atoms or the number of those electrons which an element uses is called:
   (A) Radical (B) Valency✓
   (C) Compound (D) Ion
8. A radical has a charge:
   (A) Positive (B) Negative
   (C) Neutral (D) Both (a) & (b) ✓
9. The symbol of an element may consists of letters:
   (A) First (B) Middle
   (C) Last (D) All of these✓
10. The symbol of an element represents its:
   (A) Molecule (B) Atom✓
   (C) Radical (D) Valency
11. The symbols of some elements are taken from their names:
   (A) Latin✓ (B) Greek
   (C) Roman (D) English
12. The Latin name of sodium is:
   (A) Aurum (B) Natrium✓
   (C) Cuprum (D) Argentums
13. The Latin name of gold is:
   (A) Stannum (B) Cuprum
   (C) Aurum✓ (D) Natrium
14. Cuprum is the Latin name of:
   (A) Gold (B) Lead
   (C) Silver (D) Copper✓
15. Ferrum is the Latin name of:
   (A) Silver (B) Gold
   (C) Copper (D) Iron✓
16. Stannum is the Latin name of:
   (A) Potassium (B) Sodium
   (C) Tin✓ (D) Magnesium
17. Kalium is the Latin name of:
   (A) Mercury (B) Potassium✓
   (C) Lead (D) Iron
18. Plumbum is the other name of:
   (A) Lead✓ (B) Iron
   (C) Zinc (D) Copper
19. The Latin name of silver is:
   (A) Ferrum (B) Kalium
   (C) Argentums✓ (D) Stannum
20. Hydrargyrum is the Latin name of:
   (A) Mercury✓ (B) Lead
   (C) Potassium (D) Silver
21. Another name of air is:
   (A) Hydrogen (B) Oxygen✓
   (C) Calcium (D) Carbon
22. Natrium is another name of:
   (A) Sodium✓ (B) Nitrogen
   (C) Potassium (D) Hydrogen
23. The symbol of gold is:
   (A) Au✓ (B) Ne
   (C) Ag (D) Mg
24. Carbon is shown by the symbol:

(A) Ca (B) Co
(C) H (D) C ✓

25. The symbol of silver is:
(A) Sn (B) Ag✓
(C) S (D) Zn

26. Na is the symbol of:
(A) Nitrogen (B) Neon
(C) Sodium✓ (D) Nickel

27. The symbol of oxygen is:
(A) P (B) O✓
(C) N D) Co

28. Symbol of cobalt is:
(A) C (B) Cl
(C) Co✓ (D) Ca

29. Phosphorus is denoted by the symbol:
(A) P✓ (B) F
(C) Ph (D) S

30. The chemical formula of water is:
(A) O_2 (B) Ca
(C) H_2O✓ (D) CO_2

31. Chemical formula oxygen is:
(A) O✓ (B) H_2
(C) CO_3 (D) CO_2

32. Chemical formula of carbon dioxide is:
(A) CO_3 (B) CO_2✓
(C) Ca (D) Na

33. Chemical formula of sodium chloride:
(A) NaCl✓ (B) H_2O
(C) CO_2 (D) NO_3

34. Sodium chloride is a &n:
(A) Base (B) Acid
(C) Salt✓ (D) Alkali

35. The salt we use in our food is;
(A) Sodium chloride✓ (B) Potassium soleplate
(C) Calcium chloride (D) Hydrogen carbonate

36. Chemical formula of calcium chloride is:
(A) NaCl (B) $Cacl_2$✓
(C) H_2O (D) $Ca_3(PO_4)_2$

37. Chemical formula of aluminum chloride is:
(A) $Cacl_2$ (B) NaCl
(C) $Alcl_3$✓ (D) K_2SO_4

38. The digit which is usually not written in a chemical formula:
(A) 1✓ (B) 2
(C) 3 (D) 4

39. It the number of compound radical is more than one, it is written in:
(A) Dashes (B) Dots
(C) Signs (D) Brackets✓

40. The valency of an atom is its capacity to combine with the number of atoms:
(A) Hydrogen (B) Chlorine
(C) Oxygen (D) Both (a) & (b) ✓

41. Which one is not related to compound radicals?
(A) SO_4^{2-} (B) PO_4^{3-}
(C) Ca^{2+} (D) NO_3^{1-}✓

42. Which one radical carry variable charge:
(A) Zn^{2+} (B) Fe^{3+}
(C) Mg^{2+} (D) Na^{+}✓

43. How many element exist naturally in liquid state:
(A) Four (B) Five✓
(C) Six (D) Seven

44. The symbol of cobalt is:
(A) Cr (B) Co✓
(C) Ca (D) Co

45. The number of elements present in the compound $Ca_3(PO_4)_2$ are:
(A) 3 (B) 4
(C) 5 (D) 6✓

46. Symbol for metallic element commonly used in electric writing at domestic level is:
(A) Fe (B) Au
(C) Cu✓ (D) Ag

47. Indicate the group of elements showing variable charges:
(A) Aluminum and sodium (B) Copper and Iron
(C) Calcium and potassium (D) Iron and potassium✓

48. **The metal which liberates hydrogen by reacting with acids is:**
(A) Gold (B) Magnesium
(C) Mercury✓ (D) Silver

49. **In a chemical reaction $CaCo_3$+ H_2 So_4, the products are:**
(A) $CaCo_3 + Co_2$ (B) $H_2 So_4 Co_2$
(C) $H_2O + Co_2 + CaSo_4$✓ (D) $CaCo_3 + CaSO_4$

50. **Mercury is an element which is found in forms:**
(A) Solid (B) Liquid✓
(C) Gas (D) Gas-liquid

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7. Chemical Change and Chemical Bonds

1. **A permanent change in which a substance undergoes change in its shape as well as composition is called:**
(A) Chemical change✓ (B) Physical change
(C) Chemical equation (D) Chemical bond

2. **A temporary change in which a substance undergoes a change in its shape but not in its composition is called:**
(A) Chemical change (B) Physical change✓
(C) Chemical equation (D) Chemical bond

3. **A short and comprehensive method to express a chemical reaction is called:**
(A) Chemical change (B) Chemical bond
(C) Chemical equation ✓ (D) Synthesis

4. **The bond formed by transference of one or more electrons from one atom to another atom is called:**
(A) Chemical bond (B) Ionic bond✓
(C) Covalent bond (D) All of these

The forces of attraction which hold the atoms together in elements or compounds is called:
(A) Covalent bond (B) Chemical bond✓
(C) Ionic bond (D) All off these

6. **The forces of attraction which hold the atoms together by mutual sharing of electrons is called:**
(A) Covalent bond ✓ (B) Chemical bond
(C) Ionic bond (D) None of these

7. **A pure chemical compound obtained from different sources always has a constant ratio of masses of different elements present in ; this is called:**
(A) Law of conservation of mass (B) Law of constant proportion✓
(C) Both of the above (D) None of the above

8. **When two or more elements or compounds combine to form only one new compound, the reaction is called:**
(A) Physical change (B) Chemical Change
(C) Chemical equation (D) Synthesis✓

9. **The conversion of compounds on heating to smaller compounds or elements is called:**
(A) Composition (B) Simple composition
(C) Simple decomposition✓ (D) Chemical equation

10. **Matter can neither be created not destroyed during a chemical reaction but it may change its shape and composition. This is called:**
(A) Law of conservation of mass✓ (B) Law of constant proportion
(C) Both of these (D) None of these

11. **The changes are of two types:**
(A) Chemical (B) Physical
(C) Geographical (D) Both (a) & (b) ✓

12. **Melting of ice is a:**
(A) Chemical (B) Physical

change (B) change✓

(C) Permanent change (D) None of the above

13. **The conversion of milk into yogurt is a:**
(A) **Chemical change ✓** (B) Physical change
(C) Temporary change (D) None of these

14. **Burning of candle is a:**
(A) **Chemical change✓** (B) Physical change
(C) Temporary change (D) All f these

15. **When elements and compounds combine together, occurs:**
(A) Chemical equation (B) Chemical change
(C) Physical change (D) **Chemical reaction✓**

16. **The chemical combination of carbon and oxygen produces:**
(A) Hydrogen (B) Water
(C) **Carbon dioxide✓** (D) Carbon

17. **A chemical equation represents:**
(A) Chemical change (B) **Chemical reaction✓**
(C) Physical change (D) Chemical formula

18. **When two or more elements or compounds combine to form only a single new compound, this reaction is called:**
(A) Chemical change (B) Chemical equation
(C) **Synthesis or combination ✓** (D) Physical combination

19. **In the process of decomposition, are decomposed:**
(A) Elements (B) **Compounds✓**
(C) Bases (D) Acids

20. **Oxygen is prepared in laboratory by the decomposition of:**
(A) Calcium soleplate (B) Potassium nitrate
(C) Hydrochloric acid (D) **Potassium chlorate✓**

21. **Carbon dioxide is prepared in industrial scale by heating lime stone in:**
(A) Furnace (B) **Kiln✓**
(C) Air (D) Room

22. **The number of electrons and protons in an atom is:**
(A) **Equal✓** (B) Different
(C) Same (D) Constant

23. **The fundamental particles of atom are in number;**
(A) 2 (B) **3✓**
(C) 4 (D) 5

24. **Electrons have charge on them:**
(A) Positive (B) **Negative✓**
(C) Neutral (D) None of these

25. **Protons have charge on them:**
(A) Negative (B) **Positive✓**
(C) Neutral (D) None of these

26. **Neutrons have charge:**
(A) Positive (B) Negative
(C) **Neutral✓** (D) None of these

27. **Same charges each other:**
(A) **Repulse✓** (B) Attract
(C) Do nothing (D) None of these

28. **Opposite charges each other:**
(A) Repulse (B) **Attract✓**
(C) Do nothing (D) All of these

29. **Ionic compounds are soluble in:**
(A) Oil (B) Lubricants
(C) **Water✓** (D) Petrol

30. **Ionic compounds in solid form are:**
(A) **Bad conductors of electricity✓** (B) Good conductors of electricity
(C) Semi-conductors of electricity (D) None of these

31. **Covalent bonds exist in:**
(A) Solid (B) Liquid
(C) Gas (D) **All of these✓**

32. **Pure covalent compounds are:**

(A) Good conductors of electricity (B) **Bad conductors of electricity✓**
(C) Semi-conductors of electricity (D) None of these

33. **Covalent compounds have melting points:**
(A) High (B) Low
(C) Moderate (D) **Both (a) & (b) ✓**

34. **Covalent compounds are easily converted into:**
(A) Gases (B) Solids
(C) **Vapors✓** (D) Liquids

35. **The certain laws followed by chemical changes are called:**
(A) Law of conservation of mass (B) Law of constant proportion
(C) **Law of chemical combination✓** (D) All of these

36. **A chemical change is:**
(A) **Boiling of egg✓** (B) Boiling of water
(C) Boiling of milk (D) Melting of ice

37. **The particles of an atom which take part in an ionic bond formation are:**
(A) Electrons (B) Protons
(C) **Neutrons✓** (D) Positrons

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8. Acids - Bases & Salts

1. **Word 'acid' is derived from:**
(A) English (B) Greek
(C) **Latin✓** (D) Roman

2. **Acid means:**
(A) Bitter (B) **Sour✓**
(C) Salty (D) Harsh

3. **The acids are found in:**
(A) Minerals (B) Plants
(C) Animals (D) **All of these✓**

4. **The acids that are obtained from minerals are called;**
(A) **Mineral acids✓** (B) Natural acids
(C) Chemical acids (D) Salty acids

5. **The acids that are obtained from animals and plants are called;**
(A) Natural acids (B) Salty acids
(C) **Organic acids✓** (D) Mineral acids

6. **Formic acid is found in:**
(A) Vinegar (B) Yogurt
(C) Apples (D) **Ants✓**

7. **Lactic acid is found in:**
(A) **Curd✓** (B) Orange
(C) Citrus fruit (D) Apples

8. **Tartaric acid is found in:**
(A) Apples (B) **Grapes✓**
(C) Vinegar (D) Curd

9. **Acetic acid is found in:**
(A) Curd (B) Apples
(C) **Vinegar✓** (D) Ants

10. **Oxalic acid is obtained from:**
(A) Yogurt (B) **Grapes✓**
(C) Apples (D) Tomatoes

11. **Apples are the source of:**
(A) Lactic acid (B) **Malice acid ✓**
(C) Formic acid (D) Tartaric acid

12. **Citrus fruit is the source of:**
(A) Tartaric acid (B) Formic acid
(C) **Citric acid✓** (D) Acetic acid

13. **The taste of acids is:**
(A) Salty (B) **Sour✓**
(C) Harsh (D) Bitter

14. **Acids turn blue litmus:**
(A) **Red✓** (B) Orange
(C) Green (D) Yellow

15. **Acids turn methyl orange solution:**
(A) Blue (B) Yellow
(C) **Red✓** (D) Black

16. **when acids and bases react with each other, they form:**

(A) Alkali (B) Water
(C) Salt (D) Both (b) & (c)✓

17. The process in which acids and bases react with each other is called:
(A) Neutralization✓ (B) Dehydration
(C) Hydration (D) Evaporation

18. The rust on the surface of metals is cleaned by:
(A) Bases (B) Alkali
(C) Acids✓ (D) All of these

19. Some acids are for digestion:
(A) Harmful (B) Beneficial✓
(C) Disastrous (D) None of these

20. HCL is used as:
(A) Antibiotic (B) Antiseptic✓
(C) Antigenic (D) All of these

21. It is called the "king of chemicals":
(A) Sulfuric acid ✓ (B) Formic acid
(C) Acetic acid (D) Nitric acid

22. A group of compounds that have sour taste is called:
(A) Base (B) Slat
(C) Acid✓ (D) Alkali

23. A compound whose molecule is made up of one or more hydroxyl (OH^-) group attached to the atom of the metal is called:
(A) Base✓ (B) Salt
(C) Acid (D) Alkali

24. Aqueous solution of a base has a:
(A) Soft touch (B) Soapy touch✓
(C) Hard touch (D) Slimy touch

25. Bases turn red litmus:
(A) Orange (B) Yellow
(C) Black (D) Blue✓

26. Bases turn methyl orange:
(A) Red (B) Bleu
(C) Yellow✓ (D) Pink

27. Bases turn turmeric paper:
(A) Red (B) Brown✓
(C) Pink (D) White

28. Bases turn colorless phenolphthalein:
(A) Red (B) Blue
(C) Pink✓ (D) Black

29. The compound which is formed by the neutralization between an acid and a base is called:
(A) Alkali (B) Salt✓
(C) Element (D) Mixture

30. Salts are prepared by methods:
(A) 2 (B) 3✓
(C) 4 (D) 5

31. Hemoglobin present in blood contains compounds of:
(A) Lead (B) Carbon
(C) Protein (D) Iron✓

32. Salts play role in human body:
(A) Important✓ (B) Miner
(C) Insignificant (D) Somewhat

33. Salt which are needed of the proper functioning of muscles and nervous system:
(A) Calcium (B) Potassium
(C) Sodium (D) Both (b) & (c) ✓

34. Salts which make bones strong and prevent heart attack is:
(A) Sodium (B) Potassium
(C) Calcium ✓ (D) Iodine

35. The salt which prevents blood from wounds and coagulates it is:
(A) Potash alum✓ (B) Potassium nitrate
(C) Sodium chloride (D) Potassium chloride

36. The slats which treat goiter:
(A) Sodium (B) Iodine✓
(C) Calcium (D) Magnesium

37. Which slat is used for washing clothes?
(A) Washing soda✓ (B) Potash alum
(C) Copper soleplate (D) Potassium nitrate

38. The metal which liberates hydrogen by reacting with acids is:

(A) Gold (B) Magnesium
(C) Mercury✓ (D) Silver

39. What is produced in the process of neutralization?
(A) Salt and water✓ (B) CO_2
(C) O (D) O and H_2O

40. Water solutions of acids are normally:
(A) Conductor✓ (B) Non-conductor
(C) Semi-conductor (D) Super conductor

41. Salt that is used for the treatment of goiter disease is:
(A) Iodine ✓ (B) Magnesium
(C) Potassium (D) Sodium

42. Solid's ionic compound behaves at normal temperature as:
(A) Conductor (B) Insulator✓
(C) Semi-conductor (D) Super conductor

43. You are eating tomatoes, the acid which you are taking is:
(A) Acetic acid (B) Citric acid
(C) Formic acid (D) Oxalic acid ✓

44. When calcium carbonate is mixed with sulphuric acid:
(A) Reaction starts and then stops (B) Reaction does not start
(C) Reaction starts and continues (D) Reaction starts after sometime✓

45. The chemical used for the preparation of detergents are:
(A) Naphtha, Sulphuric acid, washing soda✓ (B) Nitric acid, naphtha, Backing soda
(C) Hydrochloric acid, Naphtha, Baking soda (D) Naphtha, Sulphuric acid, Baking soda

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9. Carbon & Its Compounds

1. The existence of an element in more than one crystalline forms is called:
(A) Allotropy✓ (B) Catenation
(C) Biochemistry (D) Crystallization

2. The ability of carbon to form linkage with other carbon atoms is called:
(A) Crystallization (B) Catenation ✓
(C) Allotropy (D) Neutralization

3. About 80% of all compounds contain:
(A) Protein (B) Calcium
(C) Iron (D) Carbon✓

4. The crystalline of forms of carbon are:
(A) 1 (B) 2
(C) 3✓ (D) 4

5. The crystalline carbon is:
(A) Diamond (B) Becky ball
(C) Graphite (D) All of these✓

6. The most precious and costly carbon is:
(A) Graphite (B) Diamond✓
(C) Coke (D) Lamp black

7. Diamond is measured in:
(A) Kilos (B) Grams
(C) Carats ✓ (D) None of these

8. In its pure form, diamond is:
(A) White (B) Blue
(C) Black (D) Colorless✓

9. Diamond is a of _____ heat and electricity:
(A) Good conductor (B) Bad conductor✓
(C) Semi-conductor (D) None of these

10. It does not react with:
(A) Acids (B) Alkalis
(C) Bases (D) Both (a) & (b)✓

11. Also used for cutting glass:
(A) Diamond✓ (B) Graphite
(C) Coal (D) Coke

12. It is slippery to touch:
(A) Graphite✓ (B) Diamond

(C) Coke (D) Becky balls

13. Graphite is a _____ of electricity:
(A) Good conductor✓ (B) Semi-conductor
(C) Bad conductor (D) All of these

14. Graphite is used in:
(A) Ink (B) Lead pencil✓
(C) Nib of ball point (D) All of these

15. In atomic reactors, graphite rods are used to reduce the speed of:
(A) Protons (B) Electrons
(C) Neutrons✓ (D) All of these

16. The non-crystalline forms of carbon are:
(A) 1 (B) 2
(C) 3 (D) 4✓

17. It is the non-crystalline form of carbon:
(A) Coal (B) Coke
(C) Charcoal (D) All the above✓

18. Coal had been formed by decaying _____ under the surface of the earth because of high pressure and temperature:
(A) Plants✓ (B) Animals
(C) Fossils (D) Minerals

19. It is prepared by heating coal in absence of air:
(A) Graphite (B) Coke✓
(C) Charcoal (D) Lamp black

20. It is obtained by heating wood and other organic compounds at high temperature in absence of air:
(A) Coke (B) Coal
(C) Charcoal✓ (D) Lamp black

21. It is obtained by heating wood in a limiter supply of air:
(A) Coal (B) Wood charcoal✓
(C) Sugar charcoal (D) Animal charcoal

22. When bones are heated in absence of air, the residue is called:
(A) Sugar charcoal (B) Wood charcoal
(C) Animal charcoal ✓ (D) Ash of bones

23. By the dehydration of sugar with concentrated sculpture acid is obtained:
(A) Animals (B) Sugar charcoal✓
(C) Graphite (D) Wood charcoal

24. When burning kerosene of oil or vegetable oil in limited supply of air, the soot is called:
(A) Coke (B) Coal
(C) Charcoal (D) Lamp black✓

25. It is estimated that a man exhales carbon dioxide gas in a day:
(A) 40 dm^3✓ (B) 60 dm^3
(C) 40 dm^3 (D) 100 dm^3

26. Carbon dioxide acts on fire:
(A) Inflames (B) Extinguishes✓
(C) Does noting (D) All of these

27. Formula of carbon dioxide is:
(A) CO (B) CO_3
(C) CO_2✓ (D) CO_4

28. The color of carbon dioxide is:
(A) Light yellow (B) Sky blue
(C) Thick green (D) Colorless✓

29. Carbon dioxide is:
(A) Heavier than water (B) Heavier than air✓
(C) Light than air (D) None of these

30. Humans and animals _____ carbon dioxide gas:
(A) Exhale ✓ (B) Inhale
(C) Both of these (D) None

31. Plants _____ carbon dioxide gas:
(A) Exhale ✓ (B) Inhale
(C) Both of these (D) None of these

32. Plants produce food due to:
(A) Hydrogen (B) Carbon
(C) Carbon dioxide✓ (D) Chlorine

33. For the preservation of fruits, these are stored in an atmosphere enriched with:

(A) Oxygen (B) Hydrogen
(C) Carbon (D) Carbon dioxide✓

34. **As an artificial respiration, gas is used:**
(A) Carbonate (B) Cryogen✓
(C) Nitrogen (D) Carbon dioxide

35. **Candle flam has parts:**
(A) 2 (B) 3
(C) 4✓ (D) 5

36. **Outer most part of the candle flame is:**
(A) Non-luminous zone✓ (B) Dark zone
(C) Luminous zone (D) Blue zone

37. **The bottom party of the candle flame is:**
(A) Dark zone (B) Luminous zone
(C) Non-luminous zone (D) Blue zone✓

38. **No combustion occurs in the zone:**
(A) Dark zone✓ (B) Luminous zone
(C) Blue zone (D) Non-luminous zone

39. **Complete combustion occurs in:**
(A) Non-luminous zone (B) Blue zone✓
(C) Luminous zone (D) Dark zone

40. **Branch of chemistry which deals with carbon compounds is called:**
(A) Organic chemistry ✓ (B) Inorganic chemistry
(C) Bio-chemistry (D) Physical chemistry

41. **Which is called the king of chemicals?**
(A) HCL (B) NHO_3
(C) H_2SO_4✓ (D) CH_3COOH

42. **Which is the gas used for making corroborated beverages:**
(A) H_2S (B) H_2
(C) CO_2✓ (D) O_2

43. **When two hydrogen atoms and one oxygen atom combine chemically, they form:**
(A) Compound (B) Element✓
(C) Ion (D) Mixture

44. **When we pass carbon dioxide through lime water, milky ness appears due to formation of:**
(A) Calcium carbonate✓ (B) Magnesium carbonate
(C) Sodium carbonate (D) Sodium hydroxide

45. **Which one is the example of crystalline form of carbon?**
(A) Coal (B) Charcoal
(C) Graphite✓ (D) Cell

****

10. Manufacture of Useful Products from Common Raw Materials

1. **How many processes are commonly adopted to convert raw materials into useful products?**
(A) 1 (B) 2
(C) 3✓ (D) 4

2. **About 90% of organic chemicals used as raw material are obtained from:**
(A) Petroleum✓ (B) Natural Gas
(C) Minerals (D) Metals

3. **The computer revolution is based on the element:**
(A) Aluminum (B) Silicon✓
(C) Copper (D) Nickel

4. **Sodium hydroxide with vegetable oil makes:**
(A) Soaps✓ (B) Powders
(C) Soda (D) Salts

5. **The fraction of crude oil is:**
(A) Potash (B) Naphtha✓
(C) Soda (D) Soap

6. **These can remove more sticky stains than soaps:**
(A) Soda (B) Powders
(C) Detergents✓ (D) Bleaches

7. **______ agents are added to the detergents for protecting the washing machines from rusting:**

(A) Bleaching (B) Anti-rusting✓
(C) Metallic (D) Anti-stains

8. **To promote the growth of plants, are used:**
(A) Chemicals (B) Minerals
(C) Salts (D) Fertilizers✓

9. **Carbon is obtained from _____ by the plant.**
(A) Carbon dioxide✓ (B) Water
(C) Hydrogen (D) Soil

10. **Hydrogen is obtained by the plant from:**
(A) Soil (B) Air
(C) Water✓ (D) Sunlight

11. **Nitrogen is needed by the plants for making:**
(A) Carbohydrates (B) Proteins✓
(C) Chlorophyll (D) Minerals

12. **Nitrogen helps the plant for the development of:**
(A) Branches (B) Stem
(C) Leaves (D) Both (b) & (c) ✓

13. **What element plants get naturally for their growth:**
(A) Hydrogen (B) Oxygen
(C) Carbon dioxide (D) All of these✓

14. **Phosphorus helps the plants in:**
(A) Rapid growth (B) Production of fruits
(C) Production of seeds (D) All of these✓

15. **Potassium help the plants in:**
(A) Development of fibers (B) Controlling the rate of photosynthesis
(C) Protecting from diseases (D) All of these✓

16. **Fertilizers are manufactured by using common raw materials like:**
(A) Natural gas (B) Air
(C) Nitrogen (D) Both (a) & (b) ✓

17. **Urea is a fertilizer:**
(A) Phosphorous (B) Nitrogenous✓
(C) Both of these (D) None of these

18. **In manufacturing urea, are used:**
(A) Nitrogen of the air (B) Methane of the natural gas
C) Both (a) & (b)✓ (D) None of these

19. **The fertilizer which helps in greatest production:**
(A) Ammonium nitrate✓ (B) Calcium soleplate
(C) Hydrogen (D) Phosphorus

20. **Cement is made by the mixture of:**
(A) Lime stone (B) Clay
(C) Gypsum (D) All of these✓

21. **In the manufacturing of caustic soda, washing soda, baking soda and chorine gas, is used :**
(A) Common salt✓ (B) Compounds
(C) Common acid (D) Bases

22. **You are visiting a soap factory, the most probable base which may be present in the factory will be:**
(A) Aluminum hydroxide (B) Calcium hydroxide
(C) Lime water (D) Sodium hydroxide✓

23. **The suitable area for the installation of cement industry is:**
(A) Coast (B) Plain
(C) Desert (D) Rock✓

24. **The compounds necessary for the preparation of soap:**
(A) Sodium hydroxide (B) Vegetable
(C) Fats (D) Both (a) & (b) ✓

25. **The compounds necessary for the manufacturing of detergents:**
(A) Naphtha (B) Sulfuric acid
(C) Washing soda (D) All of these✓

****

11. Liquid Pressure

1 The perpendicular force acting on one unit area of a surface is called:
(A) Pressure✓ (B) Force
(C) Pascal (D) Weight

2. The unit of pressure is:
(A) Ampere (B) Volt
(C) Pascal✓ (D) watt

3. Water flows from:
(A) High to low✓ (B) Low to high
(C) Both of these (D) None of these

4. Pressure is related with:
(A) Weight (B) Force✓
(C) Reaction (D) Direction

5. The pressure of the liquid increases with its:
(A) Height (B) Weight
(C) Force (D) Depth✓

6. Pressure of the liquid is normal at the surface of the:
(A) Container✓ (B) Place
(C) Liquid (D) All of these

7. The liquid especially water keeps its:
(A) Weight (B) Force
(C) Direction (D) Level✓

8. A liquid exerts same pressure in all directions in state of:
(A) Motion (B) Flow
(C) Rest✓ (D) Stagnation

9. Best possible answer to; "current is flow of"
(A) Electron (B) Charge
(C) Proton✓ (D) Neutron

10. Atoms is one molecule of water (H_2O) are in ratio of:
(A) 1:2 (B) 2:1✓
(C) 1:4 (D) 4:1

11. When water boils:
(A) Gas becomes solid (B) Liquid becomes solid
(C) Liquid becomes gas✓ (D) Solid becomes liquid

12. It you dipped your finger inside a liquid, the pressure exerted by the liquid on the finger would be:
(A) Different at all parts (B) Minimum at lower part
(C) Maximum on upper part (D) Same at all parts✓

13. On a unit area, the pressure is affected by:
(A) Perpendicular force✓ (B) Direct force
(C) Slant force (D) Indirect force

14. With depth, the pressure of the liquid:
(A) Decreases (B) Increases✓
(C) Remains same (D) Keep on changing

15. Liquid pressure acts at:
(A) Right angle✓ (B) Left angle
(C) Scantly (D) Horizontally

16. In state of rest, liquid exerts pressure:
(A) Different (B) Variable
(C) Same✓ (D) All of these

17. liquid, in state of rest, exerts pressure in all:
(A) Conditions (B) Situations
(C) Directions✓ (D) Surfaces

18. In state of rest, the level of every part of the free surface of a liquid is:
(A) Keep on changing (B) Same✓
(C) Different (D) Variable

19. It the perpendicular force acting on an area of one meter square is, Newton:
(A) 1✓ (B) 2
(C) 3 (D) 4

20. 1 Newton is equal to:
(A) 100 grams weight✓ (B) 200 grams weight
(C) 300 grams weight (D) 500 grams weight

****

12. Thermal Expansion

1. The device which is used to measure temperature:
   (A) Galvanometer (B) Thermometer✓
   (C) Decimeter (D) Richter scale
2. The temperature of a substance at which it changes its state from solid to liquid is called:
   (A) Melting point✓ (B) Boiling point
   (C) Freezing point (D) Spreading point
3. The temperature of a substance at which it changes its state from liquid to gas is called:
   (A) Boiling point✓ (B) Freezing point
   (C) Melting point (D) Spreading point
4. The temperature of a substance at which it reverses its shape from liquid to solid is called:
   (A) Melting point (B) Freezing point✓
   (C) Expansion point (D) Boiling point
5. The temperature of the center of the sun is estimated of the sun is estimated about:
   (A) 10^7K✓ (B) 10^3K
   (C) 6×10^3K (D) 6×10^3K
6. It is estimated that the temperature of the outer surface of the sun is:
   (A) 10^3K (B) 10^7K
   (C) 6×10^3K✓ (D) 6×10^7K
7. The temperature of the inner surface of the sun is ______ than outer surface:
   (A) Greater (B) Lesser✓
   (C) Equal (D) Same
8. The temperature of the outer surface of the earth is ______ than its inner surface:
   (A) Greater (B) Equal
   (C) Lesser ✓ (D) Same
9. The volume of metallic objects increases on:
   (A) Heating✓ (B) Cooling
   (C) Compressing (D) Expanding
10. The length of metallic objects ______ on heating:
    (A) Decreases (B) Remains same
    (C) Moderates (D) Increases✓
11. Gaps are left between railway tracks. If it is not done so, it may:
    (A) Contract (B) Melt
    (C) Twist✓ (D) Example
12. The volume of a given mass of gas ______ by heating:
    (A) Decreases (B) Increases✓
    (C) Remains same (D) Keeps on changing
13. The volume of gas, by cooling:
    (A) Increases (B) Decreases✓
    (C) Does not change (D) Keeps on changing
14. When water is cooled down, its volume decreases. This continues up to:
    (A) 4°C✓ (B) –4°C
    (C) –2°C (D) 2°C
15. The density and volume of ice is ____ than water:
    (A) Lesser✓ (B) Greater
    (C) Equal (D) Same
16. Ice floats on the surface of water because:
    (A) Its density is greater than water (B) Its density is lesser than water✓
    (C) Its density is equal to water (D) None of these
17. Total temperature measuring scales are:
    (A) 2 (B) 3✓
    (C) 4 (D) 5
18. Normal human body temperature is:
    (A) 98°C (B) 99°
    (C) 100°C (D) 101°C
19. The melting point of ice is detonated as:
    (A) 0°C✓ (B) –1°C

(C) −10°C (D) −2°C

20. **The boiling point of water is denoted as:**
(A) 100°C✓ (B) 110°C
(C) 150°C (D) 160°C

21. **It temperature of a place is 60°C. Find its value in Kelvin:**
(A) 132 (B) 473
(C) 273 (D) 333✓

22. **It temperature of a body is 40°C, then its value is °F will be:**
(A) 104✓ (B) 102
(C) 100 (D) 98

23. **Celsius scale and Fahrenheit scales are related by:**
(A) $F = \frac{9}{5}C° + 32$✓ (B) $F = \frac{9}{5}C° + 32$
(C) $F = \frac{9}{5}C° - 32$ (D) $F = \frac{9}{5}C° - 32$

24. **The thermometer that shows the boiling of water in a pan is:**
(A) Keeling (B) Cactus✓
(C) Fare (D) None

25. **It 20°C temperature is a thing, its will in Kelvin scale be:**
(A) 253K (B) 273
(C) 293K✓ (D) 313K

****

13. Light

1. **A piece of transparent material bounded by two spherical surfaces is called:**
(A) Image (B) Lens✓
(C) Eye (D) Camera

2. **A lens which thick at the middle and thinner at the edges is called:**
(A) Convex lens✓ (B) Concave lens
(C) Spherical lens (D) Circular lens

3. **A lens thin at the middle and thicker at the edges is called:**
(A) Spherical lens (B) Circular lens
(C) Convex lens (D) Concave lens✓

4. **The center point of the lens is called:**
(A) Principal axis (B) Optical center✓
(C) Principle focus (D) Focal length

5. **Organ for watching things is:**
(A) Camera (B) Lens
(C) Eye✓ (D) Optic

6. **The device which is used to obtain image on sensitive film is:**
(A) Eye (B) Camera
(C) Lens (D) Optic

7. **The center of sphere of which lens surface is a part:**
(A) Principal axis (B) Optical center✓
(C) Center of curvature✓ (D) Principal focus

8. **A straight line joining centers of curvatures of lens is called:**
(A) Principal focus (B) Principal axis✓
(C) Center of curvature (D) Focal length

9. **A point where parallel rays meet or appear to come from after refraction through lens is called:**
(A) Principal focus✓ (B) Center of curvature
(C) Optical center (D) Principal axis

10. **Distance of principal focus from optical center is:**
(A) Optical center (B) Principal focus
(C) Principal axis (D) Focal length✓

11. **The image that can be obtained on screen is called:**
(A) Virtual image (B) Real image✓
(C) Ordinary image (D) Special image

12. **Image that cannot be obtained on screen is called:**
(A) Virtual image✓ (B) Real image

(D) Principal axis

(C) Special image (D) Ordinary image

13. **Method to trace image geometrically is called:**
(A) Camera (B) Eye
(C) Ray diagram✓ (D) Focus

14. **The image obtained on screen by convex lens is:**
(A) Virtual (B) Real✓
(C) Imaginary (D) Ideal

15. **The image formed by a lens can be found very easily through a ray diagram:**
(A) Location of image (B) Nature of image
(C) Both (a) & (b) ✓ (D) None of these

16. **The diaphragm of camera works like:**
(A) Retina (B) Pupil
(C) Iris✓ (D) Cornea

17. **The center of iris in the eye is pupil and it works like camera's:**
(A) Diaphragm (B) Sensitive film
(C) Aperture✓ (D) Lens

18. **Both eye and camera have lens:**
(A) Concave (B) Convex✓
(C) Contact (D) Connecting

19. **In a dim light, iris:**
(A) Expands (B) Spreads
(C) Contracts✓ (D) Closes

20. **The hard and thick layer of human eye is:**
(A) Sclera✓ (B) Cornea
(C) Pupil (D) Iris

21. **it an object is placed between F and 2F in front of a convex lens,, the image formed will be:**
(A) Inverted and small (B) Inverted and large
(C) Real and small✓ (D) Virtual and large

22. **A been of light passing through a concave lens. In it point represents:**
(A) Optical center (B) Center of curvature

23. **The complexion of Sadie's elder and younger sisters is less dark. The complexion of Sadie will be:**
(A) Dark (B) Fair
(C) Less dark✓ (D) More fair

24. **The height of Acid's whole family is tall and complexion is black. Height and complexion of Acid will be:**
(A) Medium height and dark complexion (B) Short height and dark complexion
(C) Tall with less dark complexion (D) Tall with dark complexion✓

25. **Can form virtual image:**
(A) Convex lens (B) Concave lens✓
(C) Contact lens (D) All lenses

****

14. Electricity & Magnetism

1. **Every consumed by one coulomb charge is called:**
(A) Volt (B) Potential difference✓
(C) Kilowatt-hour (D) Electric power

2. **S.I. unit for potential difference is:**
(A) Volt✓ (B) Watt
(C) Amphere (D) Ohm

3. **The instrument which is used to detect electric current is:**
(A) Galvanometer (B) Lactometer
(C) Thermometer (D) Kilometer

4. **The production of electricity through flowing water is called:**
(A) Thermal power (B) Hydal power✓
(C) Wind power (D) Nuclear power

5. **Production of electricity by burning fuel is called:**
(A) Hydal power (B) Wind power

(C) Thermal power✓ (D) Nuclear power

6. S.I. unit for electric energy is:
(A) Kilowatt-hour✓ (B) Volt
(C) Watt (D) Amphere

7. Production of electricity through rays of the sun is called:
(A) Wind power (B) Nuclear power
(C) Hydal power **(D) Solar power✓**

8. Production of electricity by using kinetic energy of wind is called:
(A) Solar power **(B) Wind power✓**
(C) Hydal power (D) Thermal power

9. Energy consumed in one second is called:
(A) Wind power **(B) Electric power✓**
(C) Kinetic power (D) Solar power

10. Production of energy by nuclear fission is called:
(A) Wind power (B) Solar power
(C) Nuclear power✓ (D) Thermal power

11. Generation of current due to relative motion between magnet and coil is called:
(A) Induction (B) Magnetic induction
(C) Electric induction **(D) Electromagnetic induction✓**

12. Curran can flow through:
(A) Conductor✓ (B) Resistor
(C) Repulse (D) All of these

13. Potential difference pushes in a conductor:
(A) Protons (B) Neutrons
(C) Electrons✓ (D) None of these

14. Positive terminal of battery is at potential:
(A) Lower (B) Bottom
(C) Higher✓ (D) Moderate

15. Negative terminal of battery is at potential:
(A) Higher **(B) Lower✓**
(C) Bottom (D) Weak

16. It a body is lifted to a higher position, and then allowed to fall freely, it comes back to its:
(A) Higher position **(B) Lower position✓**
(C) Normal position (D) New position

17. Heat flows from a body at a higher temperature to a body at:
(A) Lower temperature✓ (B) Higher temperature
(C) Normal temperature (D) Average temperature

18. Water always flows from higher level to:
(A) Higher level **(B) Lower level✓**
(C) Bottom (D) Straight

19. Water always keep its:
(A) Position (B) Weight
(C) Level✓ (D) Pressure

20. As much as is the potential difference across a conductor, the current through the conductor will be:
(A) Weaker (B) Slower
(C) Greater✓ (D) Lower

21. A cell changes chemical energy into:
(A) Solar energy (B) Wind energy
(C) Nuclear energy **(D) Electrical energy✓**

22. The carbon rod at the center of the cell acts as a:
(A) Positive electrodes✓ (B) Negative electrode
(C) Neutral electrode (D) Positive-negative electrode

23. The zinc container of the cell acts as a:
(A) Positive electrode **(B) Negative electrode✓**
(C) Neutral electrode (D) Positive-negative

electrode

24. **A mixture of manganese dioxide and carbon power is packed around the carbon electrode why?**
(A) To keep cell dry (B) To keep cell moist
(C) To keep cell long working (D) **Both (b) & (c)✓**

25. **Voltage of a dry cell is:**
(A) 2 volt (B) 10 volts
(C) **1.5 volts✓** (D) 12 volts

26. **The electricity we use in our homes comes from:**
(A) **Power plant✓** (B) Nuclear station
(C) Solar rays (D) Coal mines

27. **hydal power energy is:**
(A) Costly (B) **Cheap✓**
(C) Difficult (D) Easy

28. **Hydal power is preferable to thermal power because:**
(A) It is costly (B) It pollutes environment
(C) It is easy to be provided (D) **It produce no pollution✓**

29. **The largest hydal power plant is:**
(A) **Mangla✓** (B) Tarbela
(C) Wassak (D) Ghazi Brotha

30. **Thermal energy is ______ than to hydal power:**
(A) Cheaper (B) **Costly✓**
(C) Equal (D) Preferable

31. **For producing wind power, are used:**
(A) Generators (B) Fuels
(C) **Windmills✓** (D) Steam

32. **For producing wind energy, is essential:**
(A) Windmill (B) Generator
(C) Turbine (D) **Air/wind✓**

33. **Wind-mills work at least wind speed:**
(A) 10 km/h (B) 15 km/h
(C) **20 km/h✓** (D) 50 km/h

34. **It is also important for wind power generation:**
(A) Generator (B) Turbine
(C) Windmill (D) **Height of windmill✓**

35. **Wind power is possible only in:**
(A) Mountaneous areas (B) Plain areas
(C) **Coastal areas✓** (D) Coal areas

36. **The fuel used in a nuclear power plant is:**
(A) Oil and gas (B) Coal and gas
(C) **Uranium and plutonium✓** (D) Water and wind

37. **Galvanometer is used for:**
(A) Protecting current (B) **Detecting current✓**
(C) Producing current (D) Controlling current

38. **A magnet has in it:**
(A) **Current✓** (B) Heat
(C) Power (D) Force

39. **Electric charge on proton is:**
(A) -1 (B) 0
(C) +2 (D) **+1✓**

40. **Potential difference is measured by:**
(A) Watt (B) Joule
(C) **Volt✓** (D) Ampere

41. **Galvanometer detects current when the magnet is:**
(A) Far away from the coil (B) High above the coil
(C) **Moving in the coil✓** (D) Bellow near the coil

42. **An oven uses 1.5 kilo watt-hour energy in one hour. Its power consumption in circuit will be:**
(A) **Increased✓** (B) Decreased
(C) Remained same (D) Become zero

****

15. Rocks & Minerals

1. **The solid materials making the crust of the earth are called:**
(A) Fossils (B) Minerals
(C) **Rocks✓** (D) Metals

2. **The natural materials found on the earth are called:**
   (A) Metals (B) **Minerals✓**
   (C) Fossils (D) Compounds

3. **The remains or sings of dead animals or plants of ancient times present in some rocks are called:**
   (A) Minerals (B) **Fossils✓**
   (C) Structures (D) Metals

4. **The rocks which formed by the cooling of magma or lava are called:**
   (A) **Igneous rocks✓** (B) Sedimentary rocks
   (C) Metamorphic rocks (D) Mineral rocks

5. **Rocks formed by deposition of sediments layer upon are known as:**
   (A) Igneous rocks (B) **Sedimentary rocks✓**
   (C) Metamorphic rocks (D) Mineral rocks

Rocks formed between the earth due to extreme pressure and temperature:
   (A) Igneous rocks (B) Sedimentary rocks
   (C) **Metamorphic rocks✓** (D) Mineral rocks

Rocks are of types:
   (A) 2 (B) **3✓**
   (C) 4 (D) 5

"Ignis" is a word derived from the language:
   (A) Greek (B) English
   (C) French (D) **Latin✓**

"Ignis" mens:
   (A) Poison (B) Lava
   (C) **Fire✓** (D) Volcano

Most of the rocks found on earth are:
   (A) Sedimentary rocks (B) **Igneous rocks✓**
   (C) Metamorphic rocks (D) Volcanic rocks

Basalt and granite are the types of rocks:
   (A) **Igneous✓** (B) Sedimentary
   (C) Volcanic (D) Metamorphic

12. **Fossils are not found in rocks:**
   (A) Sedimentary (B) **Igneous✓**
   (C) Volcanic (D) Metamorphic

13. **The process in which rocks are broken is called:**
   (A) Seasoning (B) Climatic
   (C) **Wreathing✓** (D) Breakage

14. **Coal, Gypsum, Rock salt and Gravel are types of rocks:**
   (A) **Sedimentary✓** (B) Igneous
   (C) Metamorphic (D) Volcanic

15. **Such rocks take centuries for formation:**
   (A) Igneous (B) **Sedimentary✓**
   (C) Volcanic (D) Metamorphic

16. **Fossils are present in rocks:**
   (A) Igneous (B) **Sedimentary✓**
   (C) Volcanic (D) Metamorphic

17. **"Metamorphic" is a word of:**
   (A) English (B) **Latin✓**
   (C) Greek (D) Roman

18. **"Metamorphic" means:**
   (A) **Changing form✓** (B) Hot rock
   (C) Volcano (D) Very hard

19. **Graphite, Quartzite Marble and Slate are types of rocks:**
   (A) **Metamorphic✓** (B) Volcanic
   (C) Sedimentary (D) Igneous

20. **It is estimated that the age of our earth is about:**
   (A) 2 billion 50 million years (B) 3.5 billion years
   (C) **4.6 billion years✓** (D) 4.5 billion year

21. **Geology is the branch of science in which studied:**
   (A) Changes on earth (B) Knowledge of earth
   (C) **Evolution and age of earth✓** (D) Rock on earth

22. **Paleontology is the branch of geology in which studied:**
   (A) Rocks (B) **Fossils✓**
   (C) Earth (D) Oceans

23. **A person who studies fossils is called:**
(A) **Paleontologist✓** (B) Psychotherapist
(C) Specialist (D) Archeologist

24. **The age of the most ancient fossils of the world is:**
(A) **3.3 billion years✓** (B) 2.25 billion years
(C) 5.4 billion years (D) 5.5 billion years

25. **Dinosaur were present on earth years ago:**
(A) 3.2 billion (B) 2.2 billion
(C) **2.25 billion✓** (D) 3.6 billion

26. **Dinosaur remained alive for about:**
(A) 1.5 billion years (B) **1.6 billion years✓**
(C) 1.8 billion years (D) 2 billion years

27. **Man appeared on earth years ago:**
(A) **2 million✓** (B) 3 million
(C) 4 million (D) 6 million

28. **According to the geologists, the age of the most ancient rock present on earth is about:**
(A) **3 billion 500 million years✓** (B) 3 billion 600 million years
(C) 4 billion 500 million years (D) 4 billion years

29. **Gemstones are used for:**
(A) **Decoration✓** (B) Medicines
(C) Cutting glass (D) Cutting iron

30. **Chromate is an ore of:**
(A) Iron (B) **Chromium✓**
(C) Copper (D) Gypsum

31. **Hematite is a famous are of:**
(A) **Iron✓** (B) Chromium
(C) Copper (D) Gypsum

32. **Iron is used to make:**
(A) Alloys (B) **Steel✓**
(C) Nickel plates (D) Aluminum plates

33. **Copper is used in:**
(A) **Electrical appliances✓** (B) Electronic
(C) Steel making (D) Aluminum plates

34. **Chemical name of natural halite is:**
(A) Gypsum (B) Chalk
(C) **Rock salt✓** (D) Sculpture

35. **The slat we use in our food is called:**
(A) Sodium hydroxide (B) Sodium bicarbonate
(C) **Sodium chloride✓** (D) Sodium oxide

36. **"Gypsum" is a word from the language:**
(A) Latin (B) **English✓**
(C) Greek (D) French

37. **"Gypsum" means:**
(A) Salt (B) **Chalk✓**
(C) Rock (D) Compound

38. **Sculpture is used in the preparation of:**
(A) **Sculpture acid✓** (B) Hydrochloric acid
(C) Nitric acid (D) Formic acid

39. **Nuclear energy is obtained from the fission of:**
(A) Aluminum (B) Barium
(C) **Uranium✓** (D) Helium

40. **Uranium is used in making:**
(A) **Atom bomb✓** (B) Carbon particles
(C) Aluminum plates (D) Crude oil refinery

41. **The example of sedimentary rocks is:**
(A) Basalt (B) Marble
(C) **Gypsum✓** (D) Clay

42. **Marble and Quartzite are the example of rocks:**
(A) Igneous (B) **Metamorphic✓**
(C) Sedimentary (D) Igneous and sedimentary

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16. Galaxies & Stars

1. **Movement of earth in its orbit caused:**
(A) Stars (B) Moon phases
(C) **Days and** (D) Seasons

nights✓

2. The field of gases and dust around the nucleus of the comet is called:
   (A) Core (B) **Coma✓**
   (C) Black hole (D) Nebula

3. Temperature of the outer surface of the sun is:
   (A) 15000°C (B) 12000°C
   (C) **6000°C✓** (D) 3000°C

4. In how many seconds light reaches from the sun to the earth?
   (A) 600 (B) 500
   (C) 400 (D) **300✓**

5. Comets revolve around the:
   (A) Earth (B) Moon
   (C) **Sun✓** (D) Star

6. In the beginning of the universe, a tremendous explosion due to which whole condensed matter scattered far away in space was:
   (A) Supernova (B) Black hole
   (C) **Big bang✓** (D) Red giant

7. Innumerable piece of rocks revolving around the sun in a belt between Mars and Jupiter are:
   (A) Comets (B) **Asteroids✓**
   (C) Meteoroids (D) Red wharfs

8. The bodies in space which can shied the sunlight on earth and may cause the end of life on earth are:
   (A) Asteroids (B) Comets
   (C) Meteorids (D) **Black hole✓**

9. In the universe, in term of size, how many time smaller and bigger starts than the sun are found?
   (A) 400 times smaller to 900 times bigger (B) 350 times smaller to 1200 times bigger
   (C) 300 times smaller to 1100 times bigger (C) **450 times smaller to 1000 time bigger✓**

10. When the core of a super-giant suddenly collapses, it creates a huge explosion light than all other stars of the galaxy. This huge explosion is called:
   (A) Red Dwarf (B) Black Hole
   (C) Black Dwarf (D) **Supernova✓**

11. A tremendous explosion on the beginning of the universe is known as;
   (A) Nebula (B) Black Hole
   (C) **Big Bang✓** (D) Supernova

12. Gigantic clouds of dust and gases in space is called:
   (A) **Nebula✓** (B) Constellation
   (C) Black Hole (D) Galaxy

13. Families of stars in nebula is called:
   (A) Comet (B) Constellation
   (C) **Galaxy✓** (D) Black Hole

14. Such a galaxy containing our solar system is known as:
   (A) Nebula (B) **Milky way✓**
   (C) Supernova (D) Big Bang

15. Shining objects of gases in nebula which have their own light are:
   (A) Comets (B) Asteroids
   (C) Meteorids (D) **Stars✓**

16. Shining objects of gases which emit no light of their own are called:
   (A) Asteroids (B) Meteoroids
   (C) **Planets✓** (D) Stars

17. Cluster of stars is called:
   (A) Galaxy (B) **Constellation✓**
   (C) Nebula (D) Meteoroid

18. A star whose core contains neutrons only
   (A) **Neutron star✓** (B) Red Giant
   (C) White Dwarf (D) Supernova

19. An astronomical object of immense density and gravity is called:
   (A) Supernova (B) **Black Hole✓**
   (C) Star (D) Galaxy

20. Fragments of rocks revolving around the sun between Mars and Jupiter are called:
(A) Meteoroids (B) Neutron Stars
(C) **Asteroids✓** (D) Comets

21. 'A ball consisting of rocks, ice, dust and gases revolving around the sun in an elliptical orbit is called:
(A) Meteoroid (B) Meteorit
(C) Asteroid (D) **Comet✓**

22. Rocks or fragments of rocks and iron traveling in space are called:
(A) Comets (B) **Meteoroids✓**
(C) Meteorites (D) Asteroids

23. Fragments of rocks which strike the surface of the earth are called:
(A) Asteroids (B) Meteoroids
(C) Comets (D) **Meteorites✓**

24. Our earth in the universe is like a:
(A) Moon (B) Sun
(C) **Particle✓** (D) Prominent body

25. Air, soil, stars, planets and all other objects present in space are called:
(A) **Universe✓** (B) Solar System
(C) Big Bang (D) World

26. The theory which states that the universe came into being as a result of a tremendous explosion is called:
(A) Theory of mass conservation (B) Theory of constant proportion
(C) **Big Bang Theory✓** (D) Universal Theory

27. The universe had come into being years ago:
(A) **15 billion✓** (B) 20 billion
(C) 25 billion (D) 30 billion

28. Nebula is a word of the language:
(A) **Latin✓** (B) Greek
(C) Roman (D) German

29. Nebula means:
(A) Sky (B) **Clouds✓**
(C) Galaxy (D) Univers

30. The galaxy of our earth is called:
(A) Supernova (B) Black Hole
(C) **Milky way✓** (D) Nebula

31. Light year is a distance covered by light in:
(A) **One year✓** (B) 10 years
(C) 20 years (D) 100 years

32. Maximum temperature of stars is:
(A) 30,000°C (B) 40,000°C
(C) **50,000°C✓** (D) 100,000°C

33. The minimum of stars' temperature is:
(A) **3000°C✓** (B) 10,000°C
(C) 15000°C (D) 6000°C

34. Leo, Ursa Major, Great Bear, Orion and Mighty Hunter are the names of:
(A) Stars (B) Planets
(C) Galaxies (D) **Constellations✓**

35. Diameter of Milky way is:
(A) **100,000 Light years✓** (B) 600,000 Light years
(C) 50,000 Light years (D) 10,00,000 Light years

36. Andromeda is the name of a:
(A) Constellation (B) Star
(C) **Galaxy✓** (D) Planet

37. Deneb is the name of:
(A) Red Giant (B) **Blue Giant✓**
(C) White Dwarf (D) Black Dwarf

38. Bernard Star is a:
(A) **Red Giant✓** (B) Black Dwarf
(C) White Dwarf (D) Blue Giant

39. A star whose temperature is greater than 15000°C is called:
(A) Red Giant (B) **Blue Giant✓**
(C) Yellow Star (D) White Dwarf

40. A star whose temperature is less than 15000°C is called:
(A) **Red Giant✓** (B) Blue Giant
(C) White Dwarf (D) Black Dwarf

41. The core of neutron star contains only:

(A) Protons (B) **Neutrons✓**
(C) Electrons (D) Positrons

42. **Diameter of a neutron star is usually:**
(A) **10 Kilometer✓** (B) 100 Kilometer
(C) 500 Kilometer (D) 1000 Kilometer

43. **The width of the belt of an asteroid is:**
(A) **1500,000 Kilometers✓** (B) 10,00,000 Kilometers
(C) 20,00,000 Kilometers (D) 25,00,000 Kilometers

44. **The biggest meteorid fallen in 1920 in:**
(A) USA (B) UK
(C) Kenya (D) **Namibia✓**

45. **Ceres is the biggest asteroid of the world, Its diameter is:**
(A) **1000 Kilometers✓** (B) 3000 Kilometers
(C) 5000 Kilometers (D) 6000 Kilometers

17. Structure of Living Things

- ***Choose the correct answers:***

1. *Plants and animals are made up of:*
(A) **Nucleus✓** (B) Cells
(C) Organisms (D) Cytoplasm

2. *In plants, the cell membrane is surrounded by a thick:*
(A) **Cell wall✓** (B) Membrane
(C) Cell cover (D) Body

3. *A cell consists of ——— main parts.*
(A) Two (B) Four
(C) **Three✓** (C) Five

4. *The cell is a unit which is present in all ——— organisms.*
(A) Non-living (B) **Living✓**
(C) Kind of (C) Unicellular

5. *The thin layer which encloses the nucleus is:*
(A) Cell membrane (B) Membrane
(C) **Nuclear membrane✓** (D) Cell wall

6. *The jelly-like substance which is present in the cell is:*
(A) Nucleoplasm (B) Plasma
(C) Chloroplast (D) **Cytoplasm✓**

7. *Lungs and hearts are present in ——— organisms such as frogs and rabbits.*
(A) Unicellular (B) **Multicellular✓**
(C) Living (D) Non-living

8. *Amoeba and bacteria are both single celled:*
(A) **Animals✓** (B) Plants
(C) Insects (D) Reptiles

9. *Amoeba is different from other unicellular organisms because it is:*
(A) Regular shaped (B) Oval shaped
(C) **Irregular shaped✓** (D) Shoe shaped

10. *Vacuole in unicellular organisms, stores the food material and removes the — material.*
(A) Organic (B) Useful
(C) **Waste✓** (D) Food

11. *Which is the controlling center of the cell ?*
(A) Cell membrane (B) **Nucleus✓**
(C) Nucleolus (D) Cytoplasm

12. *——— plays an important role in cell division.*
(A) Cell (B) **Nucleus✓**
(C) Vacuole (D) Cell wall

13. *Chloroplasts are absent in ——— cells.*
(A) **Animal✓** (B) Plant
(C) Blood (D) Body

14. *Unicellular organisms are formed by only _______ cell(s).*
(A) Two (B) **One✓**
(C) Ten (D) Five

15. *The exchange of gases (oxygen and carbon dioxide)is possible through:*
(A) Digestive system (B) Circulatory system
(C) Environment (D) **Respiratory system✓**

16. *The heart — blood to all parts of our body.*

(A) Takes (B) Provide
(C) Flows (D) **Pumps✓**

17. *The outermost boundary of plant cells is:*
(A) Solid wall (B) Cell membrane
(C) **Cell wall✓** (D) Nuclear membrane

18. *The —— produced in body is used by us to work, to move and to grow.*
(A) Power (B) **Energy✓**
(C) Oxygen (D) Food

19. *What is the correct sequence ?*
(A) **Sperm-Egg-Zygote-Embryo✓** (B) Sperm-Zygote-Egg-Embryo
(C) Zygote-Embryo-Sperm-Egg (D) Embryo-Zygote-Egg-Sperm

20. *The thin layer which encloses the nucleus is called:*
(A) Cell membrane (B) Vacuole
(C) **Nucleus membrane✓** (D) None of these

18. Major Life Process-I

- *Select the right answer:*

1. *The process of getting energy from food is called:*
(A) Digestion (B) Respiration
(C) Breathing (D) **Nutrition✓**

2. *The food we eat is known as:*
(A) Material (B) **Nutrient✓**
(C) Meal (D) Starch

3. *Things like glucose, cane sugar and starch are known as:*
(A) **Carbohydrates✓** (B) Fats
(C) Proteins (D) Inorganic material

4. *—— is present in potatoes, rice, corn and wheat.*
(A) Sugar (B) **Starch✓**
(C) Fat (D) Oils

5. *—— is processed to make cream, butter and ghee.*
(A) Oil (B) Starch
(C) **Milk✓** (D) Protein

6. *Fats and oils are also very high —— food.*
(A) Power (B) **Energy✓**
(C) Lubricant (D) Value

7. *Proteins form about —— by weight of human body.*
(A) 12-16 % (B) 10-12 %
(C) 30-40 % (D) **12-18 %✓**

8. *To regulate functions of thyroid glands, we need:*
(A) **Iodine✓** (B) Calcium
(C) Phosphorous (D) Iron

9. *Iron is necessary for the formation of blood:*
(A) Red blood cells (B) **Haemoglobin✓**
(C) White blood cells (D) Plasma

10. *—— are chemical substances needed by the body in very small quantities.*
(A) Minerals (B) Proteins
(C) **Vitamins✓** (D) Starch

11. *Calcium, Sodium and Iron are:*
(A) Salts (B) Proteins
(C) Vitamins (D) **Minerals✓**

12. *—— are very often represented by English alphabets.*
(A) Minerals (B) Carbohydrates
(C) **Vitamins✓** (D) Fats

13. *Deficiency of Vitamin —— causes night blindness.*
(A) B (B) **A✓**
(C) K (D) C

14. *Deficiency of Iodine causes:*
(A) Beri Beri (B) **Goitre✓**
(C) Weakness (D) Rickets

15. *Deficiency of Vitamin A causes:*
(A) Malaria (B) **Night Blindness✓**
(C) Tuberculosis (D) Beri Beri

16. *Deficiency of Vitamin D causes:*
(A) **Rickets✓** (B) Scurvy
(C) Pellagra (D) Beri Beri

17. *Carbohydrates consist of:*
(A) **Carbon-Hydrogen-Oxygen✓** (B) Carbon-Hydrogen-Nitrogen

(C) Carbon-Nitrogen-Oxygen (D) Oxygen-Hydrogen-Nitrogen

18. *Saliva is secreted by three ——— situated above, below and back of the tongue.*

(A) Tissues (B) Organs
(C) Bodies (D) **Glands✓**

19. *The human kidney collects urea from ——— and passes it to the bladder as urine.*

(A) Stomach (B) Intestines
(C) **Blood✓** (D) Water

20. *Iodine solution is used for testing the presence of ——— in potato.*

(A) **Starch✓** (B) Oil
(C) Fats (D) Vitamins

21. *Chyme is a thick liquid form of food present in the:*

(A) Oesophagus (B) **Stomach✓**
(C) Liver (D) Pancreas

22. *Removal of ——— and other waste products is essential in healthy bodies.*

(A) **Carbon dioxide✓** (B) Oxygen
(C) Water (D) Fats

23. *Which one of the following contains the greatest proportion of fat ?*

(A) **Milk✓** (B) Tomatoes
(C) Spinach (D) Pulses

24. *Sun flower seeds are used in manufacturing:*

(A) **Ghee✓** (B) Butter
(C) Cheese (D) Cooking Oil

25. *The basic unit for preparation of food in green plants is:*

(A) Leaves (B) Cytoplasm
(C) **Chloroplast✓** (D) Protoplasm

26. *The first product prepared by the process of photosynthesis is:*

(A) Oil (B) **Sugar✓**
(C) Protein (D) Fat

27. *The process during which energy is produced in the body from food is:*

(A) Breathing (B) Digestion
(C) Excretion (D) **Respiration✓**

28. *——— are the small pores present on the surface of leaves.*

(A) **Stomata✓** (B) Spots
(C) Fungus (D) Sacs

29. *Kidneys contain many small microscopic tubes called:*

(A) Capillaries (B) **Nephrons✓**
(C) Veins (D) Tracheas

30. *The removal of carbon dioxide, urine and sweat is a process of:*

(A) Digestion (B) **Respiration✓**
(C) Breathing (D) Excretion

31. *The juices secreted by the walls of stomach are called:*

(A) Bile (B) Pancreatic juices
(C) **Gastric juices✓** (D) Saliva

32. *The juice secreted by the walls of stomach acts on:*

(A) **Proteins✓** (B) Carbohydrates
(C) Salts (D) Fats

33. *Saliva helps the digestion of:*

(A) Proteins (B) Fats
(C) Minerals (D) **Carbohydrates✓**

34. *Water and mineral salts are absorbed by:*

(A) Stomach (B) Small intestine
(C) **Large intestine✓** (D) None of these

19. Major Life Process-II

- *Mark with a (✓) the right answer in each of the following questions:*

1. *The temperature of plant is regulated by a process called:*

(A) **Transportation✓** (B) Respiration
(C) Breathing (D) Walking

2. *In the blood circulatory system, the ——— works as pump.*

(A) Heart (B) **Capillary✓**
(C) Vein (D) Lung

3. *The messages, we receive from the environment are sent as signals to the spinal cord by sensory:*

(A) Cells (B) Muscles
(C) **Nerves✓** (D) Cords

4. *A neuron is a long — cell.*

(A) Nerve (B) Muscle
(C) Divided (D) Branched✓

5. *The pores present on the surface of ——— are called stomata.*
(A) Skin (B) Body
(C) Plants (D) Leaves✓

6. *The amount of blood in the circulatory system of a 25 years old person of an average size is:*
(A) Less than 2 litres (B) Between 2 and 4 litres
(C) **Between 4 and 6 litres✓** (D) Between 6 and 10 litres

7. *Which one of the following causes blood to exit from the heart ?*
(A) An auricle relaxes (B) An auricle contracts
(C) A ventricle relaxes (D) **An auricle contracts✓**

8. *Which one of the following contain mostly deoxygenated blood ?*
(A) Aorta (B) **Veins✓**
(C) Arteries (D) Pulmonary artery

9. *Which one of the following is not true for arteries ?*
(A) **They have thick walls✓** (B) They have many valves
(C) Carry blood away from heart (D) Pulse rate is measured from them

10. *Which one of the following part of a plant absorbs water, minerals and salts ?*
(A) **Root✓** (B) Stem
(C) Leaf (D) Flower

11. *Which one of the following carries messages through the body ?*
(A) Muscles (B) Tissues
(C) **Nerves✓** (D) Blood

12. *Select one of the following organs which is protected by ribs:*
(A) Kidney (B) Brain
(C) **Heart✓** (D) Stomach

13. *Blood from the body first enters the ——— of heart.*
(A) Right auricle (B) **Left auricle✓**
(C) Right ventricle (D) Left ventricle

14. *The Aorta is ——— which supplies oxygenated blood to all parts of the body.*
(A) A vein (B) **An artery✓**
(C) A muscle (D) A tube

15. *A reflex action is a ——— reaction in response to a stimulus.*
(A) Slow (B) Fast
(C) Quick (D) **Sudden✓**

16. *Human heart has:*
(A) One chamber (B) Two chambers
(C) Three chambers (D) **Four chambers✓**

17. *Which one of the following carries message through the body:*
(A) Muscles (B) Blood
(C) **Nerves✓** (D) Tissues

18. *A reflex action is the sudden response to a:*
(A) Brain order (B) **Stimulus✓**
(C) Human needs (D) None of these

19. *The brain consists of:*
(A) Two major parts (B) **Three major parts✓**
(C) Four major parts (D) Five major parts

20. *The vessels which take blood away from heart to various organs are called:*
(A) **Arteries✓** (B) Veins
(C) Capillaries (D) Tubes

21. *Blood is a mixture of cells suspended in a liquid called:*
(A) Mixture (B) **Plasma✓**
(C) Saliva (D) Fluid

22. *Evaporation of water from the surface of the plant is known as:*
(A) Diffusion (B) Osmosis
(C) **Transportation✓** (D) Photosynthesis

23. *Water absorbed by the roots, rises up in the stem through:*
(A) Phloem vessels (B) Vessels
(C) Tubules (D) **Xylem vessels✓**

24. *The pulling force of transportation is known as the ———.*
(A) Sucking pull (B) **Transportational pull✓**
(C) Absorption (D) Pressure

25. *Transportation provides water to the plants for the ——.*
(A) Life activity (B) **Photosynthesis✓**
(C) Respiration (D) Evaporation

26. *A human skeleton consists of —— bones.*
(A) 106 (B) **206✓**
(C) 306 (D) 406

27. *Human bones have been divided into —— types.*
(A) **Four✓** (B) Three
(C) Two (D) Five

28. *Flat bones are found in skull and ——.*
(A) Legs (B) Chest
(C) **Shoulders✓** (D) Ankle

29. *—— bones are found in legs, arms and chest.*
(A) Flat (B) Small
(C) Round (D) **Long✓**

30. *Small bones are found in wrist and ——.*
(A) **Ankle✓** (B) Skull
(C) Arms (D) Legs

31. *Vertebrae and hip bones are the examples of —— bones.*
(A) Long (B) **Irregular✓**
(C) Flat (D) Small

32. *—— directs and determines human activities.*
(A) Heart (B) Blood
(C) **Brain✓** (D) Head

33. *The brain, the spinal cord and the nerves form the —— nervous system.*
(A) Total (B) Whole
(C) Complete (D) **Central✓**

20. Reproduction

Pick the correct answer:

1. *—— is the process by which all organisms produce next generation members of their own kind.*
(A) Development (B) **Reproduction✓**
(C) Growth (D) Transmission

2. *When organisms reproduce by —— methods, sex cells are not involved in the reproductive process.*
(A) **Asexual✓** (B) Reproduction
(C) Sexual (D) Bisexual

3. *In flowers, the main purpose of the —— is to protect the inner parts.*
(A) Petals (B) Stamens
(C) Ovary (D) **Sepals✓**

4. *During pollination, the —— of a flower receives pollen grains.*
(A) Style (B) Ovary
(C) **Stigma✓** (D) Carpel

5. *New plants develop from runners when roots and —— form at joints.*
(A) Branches (B) Leaves
(C) Stem (D) **Shoots✓**

6. *Which one of the following is not a process involved in asexual reproduction of plants:*
(A) Budding (B) **Fertilization✓**
(C) Cutting (D) Grafting

7. *Select from the following that reproduce both sexually and asexually:*
(A) Frog (B) **Hydra✓**
(C) Amoeba (D) Bacteria

8. *In animals, fertilization of an egg takes place in the:*
(A) **Ovary✓** (B) Testes
(C) Oviduct (D) Tubule

9. *Which one of the following is the correct sequence:*
(A) Zygote-Embryo-Sex cells-Baby (B) **Sex cells-Zygote-Embryo-Baby✓**
(C) Embryo-Zygote-Sex cells-Baby (D) None of these

10. *Suppose you read that a particular plant can form gametes. Which one of the following must be true:*
(A) The plant can produce nectar (B) The plant has several ovules
(C) **The plant can reproduce sexually✓** (D) The plant is self-pollinating

11. *A fertilized egg divides and re-divides to form the:*
(A) Zygote (B) Baby

(C) Gamete (D) **Embryo✓**

12. *When a seed germinates, the ——— emerges first and this grows into the stem of the new plant.*
(A) Radicle (B) Root
(C) **Plumule✓** (D) Leaf

13. *The three primary conditions for the germination of a seed are a supply of water, the presence of ——— and a suitable temperature.*
(A) Nitrogen (B) **Oxygen✓**
(C) Hydrogen (D) Carbon

14. *The insoluble substance contained in a seed is called:*
(A) Membrane (B) **Starch✓**
(C) Pollen (D) None of these

15. *To mature the human embryo takes:*
(A) Four months (B) Six months
(C) **Nine months✓** (D) One year

16. *Sperm and egg cells fuse to form a ———.*
(A) **Zygote✓** (B) Embryo
(C) Baby (D) Individual

17. *The sperms and eggs are together given the name of:*
(A) Pollen (B) Cell
(C) **Gamete✓** (D) Granule

18. *The fusion of male and female cells is known as:*
(A) Reproduction (B) **Fertilization✓**
(C) Combination (D) Pollination

19. *A flower is the ——— organ of plants.*
(A) Vegetative (B) **Reproductive✓**
(C) Central (D) Sex

20. *Each stamen consists of a filament and a/an:*
(A) Stigma (B) Carpel
(C) Stalk (D) **Anther✓**

21. *The ——— grows up to form the fruit.*
(A) Flower (B) Carpel
(C) **Ovary✓** (D) Ovule

22. *The sepals and petals are regarded as ——— parts of a flower.*
(A) **Non-essential✓** (B) Essential
(C) Necessary (D) Important

23. *The transfer of pollen grains from the anther to the stigma of the flower is called:*
(A) **Pollination✓** (B) Fertilization
(C) Germination (D) Reproduction

24. *Fruit is sometimes defined as a:*
(A) Ripened ovule (B) **Ripened ovary✓**
(C) Ripened flower (D) None of these

25. *When the pollen grains of a flower are transferred to the stigma of the same flower, it is called:*
(A) Pollination (B) Cross-pollination
(C) **Self-pollination✓** (D) Germination

26. *During respiration and growth, ——— reactions take place.*
(A) Physical (B) **Chemical✓**
(C) Reverse (D) Slow

27. *Asexual reproduction in plants is also known as ——— reproduction.*
(A) Sexual (B) Rapid
(C) Bisexual (D) **Vegetative✓**

21. Matter

- *Choose the correct word which best completes each statement:*

1. *All things which occupy space and have weight are called:*
(A) **Matter✓** (B) Compounds
(C) Substances (D) None of these

2. *Matter is made up of:*
(A) Crystals (B) Vapours
(C) Drops (D) **Particles✓**

3. *The ——— energy of the particles of solids is not great enough.*
(A) Potential (B) Electric
(C) Magnetic (D) **Kinetic✓**

4. *In gases, the binding force between particles is:*
(A) Strong (B) Weak
(C) **Negligible✓** (D) None of these

5. *The smallest particle of water retains its properties is called a ——— of water.*
(A) Atom (B) Compound
(C) Drop (D) **Molecule✓**

6. *A molecule of a compound is formed of two or more than two:*
(A) Atoms✓ (B) Particles
(C) Parts (D) Grains

7. *The smallest indivisible particle of matter is called:*
(A) Atom✓ (B) Molecule
(C) Drop (D) Nucleus

8. *Atoms are made up of protons, neutrons and:*
(A) Positrons (B) Electrons✓
(C) Isotopes (D) Particles

9. *The sum of protons and neutrons in the nucleus of an atom is called its:*
(A) Molecular mass (B) Molecular weight
(C) Atomic mass✓ (D) Atomic number

10. *The number of protons in an atom is called its:*
(A) Molecular number (B) Atomic mass
(C) Molecular mass (D) Atomic number✓

11. *Atomic number of Hydrogen is:*
(A) 0 (B) 1✓
(C) 2 (D) 3

12. *Atomic number of Helium is:*
(A) 1 (B) 2✓
(C) 3 (D) 4

13. *The change in which new substances are formed is called a:*
(A) Physical change (B) Chemical change✓
(C) Permanent change (D) New change

14. *In a molecule, the atoms of elements are always present in a ——— proportion.*
(A) Definite✓ (B) Proper
(C) Indefinite (D) Equal

15. *The space around the nucleus is called the ——— nuclear space of the atom.*
(A) Super (B) Magnetic
(C) Extra✓ (D) Excess

16. *Molecules are made up of:*
(A) Electrons (B) Protons
(C) Neutrons (D) Atoms✓

17. *The chemical change of rust is ———.*
(A) Iron chloride (B) Iron oxide✓
(C) Iron hydride (D) Iron sulphide

18. *Helium gas has:*
(A) One proton (B) Two protons✓
(C) Three protons (D) Four protons

19. *On heating, the kinetic energy of molecules:*
(A) Increases✓ (B) Decreases
(C) Remains constant (D) May increase or decrease

20. *Three of the following substances are alike in an important way. Select the one that is different.*
(A) Water (B) Sugar
(C) Common Salt (D) Air✓

21. *Water is being heated from 30°C to 60°C. During this process, the average kinetic energy of the molecules of water:*
(A) Is increasing✓ (B) Is decreasing
(C) Is constant (D) Varies

22. *Steam is being cooled into water. The inter-molecular attractions between the molecules of the water:*
(A) May be higher or lower than those in steam (B) Are lower than those in steam
(C) Are equal to those in steam (D) Are higher than those in steam✓

23. *The atoms of elements combined in a fixed proportion is a:*
(A) Mixture (B) Compound✓
(C) Solution (D) None of these

24. *The formation of ice-cream involves:*
(A) Physical change (B) Chemical change
(C) Both A and B✓ (D) None of these

25. *Burning is a ——— process, during burning new substances are formed.*
(A) Chemical✓ (B) Permanent
(C) Physical (D) Slow

26. *In a ———, none of the component retains its original properties.*
(A) Mixture (B) Compound✓
(C) Solution (D) Syrup

27. *A molecule of sugar, for example, glucose,*

is formed of atoms of Hydrogen, Oxygen and:

(A) Nitrogen (B) **Carbon✓**
(C) Helium (D) Sodium

28. *——— is a pure substance that cannot be broken down into simpler substances by ordinary chemical processes.*

(A) Matter (B) Compound
(C) Mixture (D) **Element✓**

29. *Calcium Oxide is a:*

(A) Metal (B) Pearl
(C) **Stone✓** (D) Liquid

30. *Calcium Oxide + Water ———.*

(A) **Calcium✓** (B) Calcium Hydroxide
(C) Hydride (D) Oxygen and Hydrogen

22. Force and Work

- *Choose the correct answer:*

1. *A body will remain at rest until a ——— acts on it.*

(A) Man (B) Boy
(C) **Force✓** (D) Pressure

2. *A ——— pulley changes the direction of the load.*

(A) Fixed (B) **Movable✓**
(C) Both A and B (D) Strong

3. *Push and pull are both words used in place of ———.*

(A) Work (B) Pulley
(C) **Force✓** (D) Axle

4. *Fraction can be ——— by using oil or grease.*

(A) Removed (B) Increased
(C) Balanced (D) **Reduced✓**

5. *An object falls towards the Earth due to the force of:*

(A) **Gravitation✓** (B) Friction
(C) Earth (D) Air

6. *The propeller of a small plane pushes the ——— to make the plane move forward.*

(A) **Air✓** (B) Space
(C) Plane (D) Force

7. *A wheel only becomes a ——— when it is combined with an axle.*

(A) Pulley (B) **Machine✓**
(C) Gear (D) Cart

8. *When a force moves a body, the force does ——— on the body.*

(A) Move (B) **Work✓**
(C) Act (D) Play

9. *A fixed pulley changes the:*

(A) Function of machine (B) **Direction of load✓**
(C) Efficiency of machine (D) None of these

10. *When a surface slides over another, the force of friction between them acts:*

(A) In the direction of sliding surface (B) Perpendicular to the direction of sliding surface
(C) **Opposite to the direction of sliding surface✓** (D) In all directions

11. *When a force is applied in one direction, this is called:*

(A) **Action✓** (B) Reaction
(C) Work (D) Push

12. *To every action, there is an equal and ——— reaction.*

(A) Balanced (B) Forceful
(C) Same (D) **Opposite✓**

13. *A swimmer pushes the water in a backward direction to move:*

(A) Backward (B) Fast
(C) **Forward✓** (D) Slow

14. *The motion of boats and ships on water is due to the force of:*

(A) **Reaction✓** (B) Pull
(C) Push (D) Water

15. *A rocket is used to carry men and equipment in:*

(A) Environment (B) Air
(C) **Space✓** (D) Universe

16. *Tension is the force produced in a body when it is ———.*

(A) Pressed (B) **Stretched✓**
(C) Pushed (D) Strengthened

17. *Friction is the force that resists or tries to resist the ——— of one material over another material.*
    (A) Work (B) Force
    (C) **Movement✓** (D) Pressure

18. *To stop moving vehicles, we use:*
    (A) **Brakes✓** (B) Shaft
    (C) Clutches (D) Paddle

19. *——— is often performed with the help of machines.*
    (A) Function (B) Sliding
    (C) Movement (D) **Work✓**

20. *A pulley or wooden planks are termed as:*
    (A) Instruments (B) **Machines✓**
    (C) Tools (D) Equipments

21. *Simple machines are usually grouped into:*
    (A) **Five categories✓** (B) Six categories
    (C) Four categories (D) Seven categories

22. *——— is the simplest of all the machines.*
    (A) Pulley (B) Wedge
    (C) **Lever✓** (D) Screw

23. *Levers are usually of:*
    (A) Two types (B) One type
    (C) Four types (D) **Three types✓**

24. *A ——— is one of the most important inventions of man.*
    (A) Computer (B) **Wheel✓**
    (C) Pulley (D) Engine

25. *A ——— is a wheel with a groove made along its circumference so that a rope can move around it.*
    (A) Circle (B) **Pulley✓**
    (C) Lever (D) Fulcrum

26. *There are two types of pulley ——— fixed pulley and:*
    (A) Closed pulley (B) Unmovable pulley
    (C) **Movable pulley✓** (D) Open pulley

27. *Movable pulleys have wide use in heavy industries for lifting and moving:*
    (A) **Heavy machinery✓** (B) Light machinery
    (C) Important machinery (D) Delicate machinery

28. *An inclined plane is also a simple:*
    (A) Plank (B) Mechanism
    (C) **Machine✓** (D) Wedge

29. *A ——— is a sort of double inclined plane.*
    (A) Machine (B) **Wedge✓**
    (C) Pulley (D) Axle

30. *——— is an agent which changes the state of an object.*
    (A) Work (B) Power
    (C) Energy (D) **Force✓**

23. Heat

- *Mark with a (✓) the right answer in each of the following questions:*

1. *The Sun is a major source of:*
   (A) Light (B) Energy
   (C) Power (D) **Heat✓**

2. *Heat is a form of:*
   (A) Light (B) Power
   (C) **Energy✓** (D) Temperature

3. *Heat from the Sun reaches Earth by:*
   (A) Conduction (B) **Radiation✓**
   (C) Convection (D) Vaporisation

4. *When the air in a car tyre becomes hot, it expands causing the pressure it exerts to:*
   (A) **Increase✓** (B) Decrease
   (C) Contract (D) Expand

5. *A sea breeze occurs during the day when the air over the land is ——— than the air over the sea.*
   (A) **Hotter✓** (B) Lighter
   (C) Cooler (D) Heavier

6. *There are 100 Celsius degrees between the freezing point of water and the ——— point of water.*
   (A) Heating (B) **Boiling✓**
   (C) Cooling (D) Evaporating

7. *Heat energy is because of the movement of:*
   (A) Atoms (B) Particles
   (C) **Molecules✓** (D) Electricity

8. *Heat is transmitted through solids by a process called:*

(A) Radiation (B) Convection
(C) Diffusion (D) **Conduction✓**

9. *On heating, solids expand in all:*
(A) Spaces (B) **Directions✓**
(C) Parts (D) None of these

10. *A thermometer is the instrument used for measuring:*
(A) Heat (B) Energy
(C) **Temperature✓** (D) Length

11. *On heating, the kinetic energy of molecules:*
(A) **Increases✓** (B) Decreases
(C) Remains constant (D) May increase or decrease

12. *Ice point on Celsius Scale is taken as:*
(A) 32 degrees (B) **Zero degree✓**
(C) 100 degrees (D) 212 degrees

13. *The boiling point of water on Centigrade Scale is:*
(A) 212°C (B) **100°C✓**
(C) 150°C (D) 90°C

14. *Melting point of ice on Fahrenheit Scale is taken as:*
(A) Zero degree (B) **32 degrees✓**
(C) 212 degrees (D) 12 degrees

15. *Mercury is a good thermometric material because:*
(A) It is opaque (B) It is shining
(C) **Its thermal expansion is constant✓** (D) It is transparent

16. *The formulae for conversion of C to F is:*
(A) $C = {}^5/_9\,(F+32)$ (B) $F = {}^5/_9\,(C-32)$
(C) $C = {}^9/_5\,(F-32)$ (D) **$C = {}^5/_9\,(F-32)$ ✓**

17. *A vacuum flask minimizes:*
(A) Conduction (B) Convection
(C) Radiation (D) **All of these✓**

18. *Heat and temperature are:*
(A) The same thing (B) **Not the same thing✓**
(C) The new thing (D) None of these

19. *Different objects expand at:*
(A) **Different rates✓** (B) Same rates
(C) Noon (D) Night

20. *Temperature of human body is measured by:*
(A) Fahrenheit thermometer (B) **Clinical thermometer✓**
(C) Minimum thermometer (D) Maximum thermometer

21. *Liquids expand ------ than solids.*
(A) Less (B) Better
(C) **More✓** (D) None of these

22. *A black surface is a better —— and absorber of heat than a white surface.*
(A) Reflector (B) Conductor
(C) Evaporator (D) **Radiator✓**

23. *All metals are good:*
(A) **Conductors✓** (B) Absorbers
(C) Radiators (D) Insulators

24. *Substances which do not allow heat to pass through them are called:*
(A) Conductors (B) **Insulators✓**
(C) Absorbers (D) Radiators

25. *------- is the transmission of heat by waves emitted by hot substances.*
(A) Conduction (B) Convection
(C) **Radiation✓** (D) None of these

26. *The normal temperature of a healthy person's body is about:*
(A) 97.4° F (B) 98.6° F
(C) 96.4° F (D) **98.4° F✓**

24. Light

● *Pick the correct answer:*

1. *Light is a form of:*
(A) **Energy✓** (B) Force
(C) Electricity (D) Power

2. *Light travels in:*
(A) Vertical lines (B) Zigzag lines
(C) Perpendicular lines (D) **Straight lines✓**

3. *Speed of light is approximately —— kilometres per second.*
(A) 3,00,00,000 (B) 30,00,000
(C) **3,00,000✓** (D) 3,000

4. *With respect to light, materials have been divided into:*

(A) Two kinds (B) **Three kinds✓**
(C) Four kinds (D) Five kinds

5. *Materials which do not allow the light to pass through them are called:*
(A) Transparent (B) **Opaque✓**
(C) Translucent (D) Thick

6. *Transparent materials make no ——— when placed in the path of light.*
(A) **Shadows✓** (B) Images
(C) Figures (D) Ways

7. *Light is able to pass partially through:*
(A) Opaque materials (B) **Translucent materials✓**
(C) Liquid materials (D) Transparent materials

8. *A solar eclipse occurs when the moon comes in between the Sun and:*
(A) **The Earth✓** (B) The clouds
(C) The stars (D) The air

9. *——— occurs when the Earth moves in between the Sun and the Moon.*
(A) Solar eclipse (B) Eclipse
(C) **Lunar eclipse✓** (D) Sun eclipse

10. *When the light falls on a cricket bat, a shadow is formed because the bat is:*
(A) Transparent (B) Translucent
(C) Solid (D) **Opaque✓**

11. *In a candle, ——— energy is changed into light energy.*
(A) Electrical (B) Potential
(C) **Chemical✓** (D) Heat

12. *How long after an explosion on the Moon would we first see its light on Earth?*
(A) About $^1/_{10}$ sec (B) **About 1 sec✓**
(C) About 10 sec (D) About 1 min

13. *Select one from the following which do not emit light:*
(A) **Moon✓** (B) Sun
(C) Satellite (D) Star

14. *Select one from the following which emits light:*
(A) Glass (B) Mirror
(C) Moon (D) **Stars✓**

15. *The Sun is approximately ——— million kilometres away from the Earth.*
(A) 300 (B) **150✓**
(C) 600 (D) 50

16. *Light from the Sun reaches the Earth in about:*
(A) 15 minutes (B) 2 minutes
(C) **8 minutes✓** (D) 18 minutes

25. Electricity and Magnetism

● *Select the best suitable answer from A, B, C and D.*

1. *A body which is short of electrons has a ——— charge on it.*
(A) Negative (B) **Positive✓**
(C) Neutral (D) Positive and Negative

2. *Metals which allow an electric current to flow through them easily are called:*
(A) **Conductors✓** (B) Radiators
(C) Transmitters (D) Electromagnetics

3. *Electromagnetics are sometimes called conductor magnetics and have a:*
(A) Hard iron core (B) Soft magnetic core
(C) **Soft iron core✓** (D) Soft zinc core

4. *The filament of light bulb is usually made of:*
(A) Iron (B) Silver
(C) Copper (D) **Nichrome✓**

5. *Nichrome is a metal which ——— the flow of electricity.*
(A) Allows (B) **Resists✓**
(C) Increases (D) Decreases

6. *The area around the magnet is called a:*
(A) **Magnetic field✓** (B) Electric field
(C) Magnetic cloud (D) Positive field

7. *As the distance from the magnet increases, the strength of magnetic field:*
(A) Increases (B) **Decreases✓**
(C) Remains the same (D) May increase or decrease

8. *The complete name for the north pole of a magnet is the:*
(A) **North seeking pole✓** (B) South seeking pole

(C) Attracting pole (D) Repelling pole

9. *The north poles of two magnets —— each other.*

(A) Attract (B) Stroke
(C) **Repel✓** (D) Pull

10. *North pole of one magnet —— the south pole of another magnet.*

(A) Repels (B) Pushes
(C) **Attracts✓** (D) Pulls

11. *An electric current is flow of:*

(A) Protons (B) **Electrons✓**
(C) Neutrons (D) Particles

12. *Nichrome is a high resistance:*

(A) Solid (B) Material
(C) Element (D) **Metal✓**

13. *Electricity can be converted into:*

(A) Mechanical energy (B) Light energy
(C) Sound energy (D) **All of these✓**

14. *Electricity can flow through:*

(A) **Copper✓** (B) Wood
(C) Plastic (D) Rubber

15. *Electricity is a form of:*

(A) Heat (B) **Energy✓**
(C) Light (D) Power

16. *Electricity flows easily through some —— like copper and aluminium.*

(A) Metals (B) Solids
(C) Radiators (D) **Conductors✓**

17. *Electricity —— easily through brass, nichrome and tungsten.*

(A) Flows (B) Passes
(C) **Does not flow✓** (D) Does not resist

18. *An unbroken path for the flow of electricity is called a:*

(A) Series circuit (B) Parallel circuit
(C) **Complete circuit✓** (D) Open circuit

19. *If the path is incomplete and the current cannot flow the circuit is called:*

(A) **An open circuit✓** (B) A parallel circuit
(C) A close circuit (D) A series circuit

20. *A circuit which allows only one path for the flow of electricity is called:*

(A) Parallel circuit (B) **Series circuit✓**
(C) Open circuit (D) Close circuit

21. *A circuit which allows several paths for the flow of electricity is called:*

(A) Series circuit (B) **Parallel circuit✓**
(C) Open circuit (D) Complete circuit

22. *Magnets made by using electric current are called:*

(A) Magno-electrics (B) Electrodes
(C) Magnetics (D) **Electromagnets✓**

23. *An electromagnet loses its magnetism when:*

(A) Current is increased (B) Current is decreased
(C) **Current is stopped✓** (D) Current is supplied

24. *—— magnets are used in loud-speakers and electric meters.*

(A) **Permanent✓** (B) Electro
(C) Dynamos (D) None of these

25. *When an electromagnet is switched on, there is a current:*

(A) Only in the coil (B) **Only in the core✓**
(C) In both the coil and the core (D) In one of them but which it does not matter

26. Earth

- *Choose the correct answer from the given choices:*

1. *Oceans and seas cover about —— of the Earth's surface.*

(A) 60 % (B) **70 %✓**
(C) 80 % (D) 90 %

2. *Rocks are of:*

(A) Two types (B) **Three types✓**
(C) Four types (D) Five types

3. *When a glacier reaches the sea, large pieces of ice break off from:*

(A) **Icebergs✓** (B) Ice
(C) Glaciers (D) Snow

4. *Oceans and seas were formed from water vapours which were released in the atmosphere by:*

(A) Evaporation (B) Transportation

(C) Cooling process (D) **Volcanic activities✓**

5. ***The taste of sea-water is:***
(A) **Salty✓** (B) Sweet
(C) Bitter (D) Normal

6. ***Rocks are ——— parts of the Earth's crust.***
(A) Essential (B) **Solid✓**
(C) Useless (D) Ancient

7. ***Pakistan has ——— mineral resources.***
(A) Few (B) Costly
(C) **Rich✓** (D) No

8. ***Minerals are chemical:***
(A) **Elements✓** (B) Ores
(C) Mixtures (D) Metals

9. ***Extrusive and intrusive rocks are:***
(A) Sedimentary rocks (B) **Igneous rocks✓**
(C) Metamorphic rocks (D) Natural rocks

10. ***The molten material of the Earth is called:***
(A) Crust (B) Clay
(C) Loam (D) **Magma✓**

11. ***Basalt is common example of:***
(A) Intrusive rocks (B) Sedimentary rocks
(C) **Extrusive rocks✓** (D) Metamorphic rocks

12. ***Igneous rocks are of:***
(A) **Two types✓** (B) Three types
(C) Several types (D) Only one kind

13. ***Potash is used for making:***
(A) Cement (B) Iron
(C) **Gun-powder✓** (D) Utensils

14. ***Granite is a common example of:***
(A) Extrusive rocks (B) **Intrusive rocks✓**
(C) Metamorphic rocks (D) Sedimentary rocks

15. ***We get pearls from sea animals called:***
(A) Pearl marine (B) **Pearl oysters✓**
(C) Pearl crabs (D) Pearl shrimps

16. ***Marble is formed from:***
(A) Gypsum (B) Gemstone
(C) Silica (D) **Limestone✓**

17. ***Gemstone is used for making:***
(A) Utensils (B) Glass
(C) **Jewellery✓** (D) Cement

18. ***Fuel is a substance which stores:***
(A) **Energy✓** (B) Minerals
(C) Power (D) Heat

19. ***Remains of plants and animals that lived long ago on our Earth are known as:***
(A) **Fossils✓** (B) Rocks
(C) Minerals (D) Fuels

20. ***Sand, clay and loam are the main types of:***
(A) Rocks (B) **Soil✓**
(C) Minerals (D) Fossils

21. ***Coal is an organic:***
(A) Metamorphic rock (B) Igneous rock
(C) **Sedimentary rock✓** (D) Chemical

22. ***All organic materials contain the elements of:***
(A) Carbon and Nitrogen (B) **Carbon and Hydrogen✓**
(C) Nitrogen and Oxygen (D) Oxygen and Hydrogen

23. ***"Rock Oil" means:***
(A) Coal (B) Natural gas
(C) Gypsum (D) **Petroleum✓**

24. ***The product of the decomposition is called:***
(A) Crust (B) Mineral
(C) **Humus✓** (D) Fossil

25. ***Soil consists of about ——— rock material.***
(A) 60 % (B) 70 %
(C) 80 % (D) **90 %✓**

26. ***Glacier is nothing but tonnes of:***
(A) **Snow✓** (B) Ice
(C) Water (D) Soil

27. ***Water in oceans warms up and cools down ——— than land.***
(A) **More slowly✓** (B) More rapidly
(C) Fastly (D) None of these

28. ***Broken blocks of glacier which happen to float in the sea are called:***
(A) Seabergs (B) **Icebergs✓**
(C) Snowbergs (D) Glacierbergs

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Mathematics (MCQs)

Numbers

Numbers: In decimal number system, we use ten symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 called digits, to represent any number.

Note: A group of figures, denoting a number is called numeral.

Types of Numbers

Natural Numbers: Numbers which we use for counting the objects are known as Natural numbers. It is denoted by 'N'. $N = \{1, 2, 3, 4 \ldots\ldots\}$

Whole Numbers: All Natural numbers together with zero form the set of all whole numbers. It is denoted by 'W'. $W = \{0, 1, 2, 3, \ldots\ldots\}$

Integers: The set of numbers which consists of whole numbers and negative numbers is known as integers. It is denoted by Z. $Z = \{\ldots\ldots -3, -2, -1, 0, 1, 2, 3, \ldots\ldots\}$

Positive Integers: The set $Z^+ = \{1, 2, 3, 4, \ldots\ldots\}$ is the set of all positive integers. It is clear that positive integers and Natural numbers are synonyms.

Negative Integers: The set $Z^- = \{-1, -2, -3, \ldots\ldots\}$ is the set of all negative integers.

Non-Negative Integers: The set $\{0, 1, 2, 3, \ldots\ldots\}$ is a set of non-negative integers.

Non-Positive Integers: The set $\{0, -1, -2, -3, \ldots\ldots\}$ is the set of non-positive integers.

Even Numbers: The numbers which are divisible by 2 are called Even numbers.

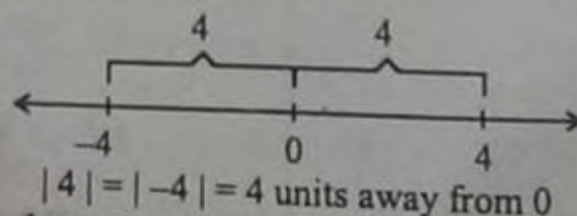
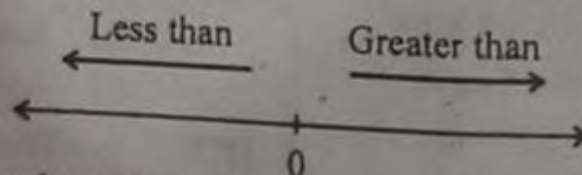
$E = \{2, 4, 6, \ldots\ldots\}$

Odd Numbers: The numbers which are not divisible by 2 are called Odd numbers.

$O = \{3, 9, 11, 17, 19, \ldots\ldots\}$

ABSOLUTE VALUES: The absolute value of a number or expression is always positive because it is the difference a number is may from zero on a number line.

Example:

$|4| = |-4| = 4$ units away from 0

Number Lines and Signed Numbers: The concept of number line is very simple. Less than is to the left and greater than is to the right.

Sometimes, we confused about the values of negative numbers. To keep things simple, remember, if

$a > b$

then $-b > -a$

Example: If $5 > 3$ then $-3 > -5$

Multiple Choice Questions (MCQs)

Q1. How many numbers between 200 and 500 are divisible by 13?

(A) 23 (B) 17
(C) 15 (D) 32

Q2. The first five multiples of 17 are:

(A) 0, 1, 17, 34, 51 (B) 17, 34, 51, 68, 85
(C) 38, 57, 76, 95, 114 (D) None of these

Q3. The number which is divisible by 7 but not by 14 is:

(A) 21 (B) 12
(C) 71 (D) None of these

Q4. The total number of even prime numbers is:

(A) 0 (B) 1
(C) 2 (D) None of these

Q5. The least prime number is:

(A) 0 (B) 1
(C) 2 (D) 3

Q6. The smallest member of set *W* is:

(A) 0 (B) 1
(C) 2 (D) 3

Q7. The smallest even number of three digits is:

(A) 98 (B) 102
(C) 998 (D) 100

Q8. The smallest 4-digit number using 7, 0, 8 and 9 is:

(A) 0879 (B) 0789
(C) 0978 (D) 7890

Q9. The cube of $\frac{1}{2}$ is:

(A) $\frac{1}{4}$ (B) $\frac{1}{8}$
(C) $\frac{1}{2}$ (D) $\frac{1}{16}$

Q10. $3 - 7 =$

(A) –7 (B) 7
(C) –4 (D) 4

Q11. If $5x + 16 = 0$, then $15|x|$ equals one of the following:

(A) $16x$ (B) $-16x$
(C) 16 (D) $15x$

Q12. Which one of the following equals the product of exactly two prime numbers?

(A) 11 . 6 (B) 14 . 23
(C) 17 . 21 (D) 13 . 23

Q13. A number whose fifth part increased by 5 is equal to its fourth part diminished by 5, is:

(A) 160 (B) 180
(C) 200 (D) 220

Q14. If $(5^a)(5^b) = \frac{5^c}{5^d}$, what is *d* in terms of *a*, *b* and *c*?

(A) $a + b - c$ (B) $a - b + c$
(C) $a + b + c$ (D) $c - a - b$

Q15. Which of the following is equal to $(3^8 \times 3^9)^{10}$?

(A) 3^{720} (B) 3^{170}
(C) 3^{27} (D) 3^{98}

Q16. If $0 < p < 1$, which of the following lists the numbers are in increasing order?

(A) $p, \sqrt{p}, p^2$ (B) $p, p^2, \sqrt{p}$
(C) $\sqrt{p}, p, p^2$ (D) $p^2, p, \sqrt{p}$

Q17. The value of x satisfying $\sqrt{5 + \sqrt[3]{x}} = 3$ is:

(A) 64 (B) 27
(C) 125 (D) 9

Q18. If, $x^{x\sqrt{x}} = (x\sqrt{x})^x$, then $x =$

(A) $\frac{1}{2}$ (B) $\frac{9}{4}$
(C) $\frac{3}{2}$ (D) $\frac{1}{4}$

Q19. $(16)^{7/4}$ is equal to:

(A) 28 (B) 128
(C) 27 (D) None of these

Q20. $\frac{4}{5}$ of a number exceeds its $\frac{2}{3}$ by 8. The number is:

(A) 30 (B) 60
(C) 75 (D) 90

Explanatory Answers

Q1.(A) Number of numbers up to 200 which are divisible by 13

$$= \frac{200}{13} = 15 + \frac{5}{13}, \text{ i.e., } 15$$

Number of numbers up to 500 which are divisible by 13

$$= \frac{500}{13} = 38 + \frac{6}{13} \text{ i.e., } 38$$

The required numbers = 38 − 15 = 23

Hence, the correct answer is choice A.

Q2.(B) The first five multiples of 17 are

$17 \times 1 = 17$
$17 \times 2 = 34$
$17 \times 3 = 51$
$17 \times 4 = 68$
$17 \times 5 = 85$

First five multiples of 17 are 17, 34, 51, 68 and 85.

Q3.(A) The number which is divisible by 7 but not by 14 is 21. Hence, the correct answer is choice A.

Q4.(B) There is only one even prime number, namely 2. Hence, the correct answer is choice C.

Q5.(C) The least prime number is 2. Hence, the correct answer is choice C.

Q6.(A) 0 is the smallest member of the set W. Hence, the correct choice is A.

Q7.(D) The smallest even number of three digits is 100. The correct choice is choice D.

Q8.(B) Using 0, 7, 8, 9, the smallest number is 0789. Hence, the correct answer is choice B.

Q9.(B) $\left(\frac{1}{2}\right)^3 = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

$= \frac{1 \times 1 \times 1}{2 \times 2 \times 2} = \frac{1}{8}$

Correct answer is choice B.

Q10.(C) $3 + (-7) = 3 - 7 = -4$

Correct answer is choice C.

Q11.(C) Solving the given equation

$15x + 16 = 0$

$\Rightarrow 15x = -16$

$\Rightarrow x = \frac{-16}{15}$

Substituting this value in $15|x|$ yields

$15|x| =$

$15\left|-\frac{16}{15}\right| = 15 \times \frac{16}{15}$

$= 16$

Correct answer is choice C.

Q12.(D) Since 13 . 23 cannot be further factored and is itself the product of two primes. Hence, correct answer is choice D.

Q13.(C) $\frac{x}{5} + 5 = \frac{x}{4} - 5 \Rightarrow \frac{x}{4} - \frac{x}{5} = 10$

$\Rightarrow 5x - 4x = 200$

$\Rightarrow x = 200$

Hence, the correct answer is choice C.

Q14.(D) $(5^a)(5^b) = \frac{5^c}{5^d}$

$5^{a+b} = 5^{c-d}$ (By power rule)

$\Rightarrow a + b = c - d$

$\Rightarrow d = c - a - b$

Hence, the correct answer is choice D.

Q15.(B) Given that, $(3^8 \times 3^9)^{10}$

$= (3^{8+9})^{10}$ (By power rule)

$= (3^{17})^{10}$

$= 3^{17 \times 10}$

$= 3^{170}$

Hence, the correct answer is choice B.

Q16.(D) For any number p, between 0 and 1

$p^2 < p$ and $p < \sqrt{p}$

Hence, the correct answer is choice D.

Q17.(A) $\sqrt{5 + \sqrt[3]{x}} = 3$

$5 + ^3 = 9$ (Squaring both sides)

$\sqrt[3]{x} = 9 - 5$

$\sqrt[3]{x} = 4$

$((x)^{1/3})^3 = (4)^3$

$x^{1/3 \times 3} = 4 \times 4 \times 4$

$\boxed{x = 64}$

Hence, the correct answer is choice A.

Q18.(B) $x^{x\sqrt{x}} = (x\sqrt{x})^x$

$x^{x\sqrt{x}} = (x \, . \, x^{1/2})^x$

$\Rightarrow x^{x\sqrt{x}} = (x^{3/2})^x$

$\Rightarrow x^{x\sqrt{x}} = (x^{3x/2})$

$\Rightarrow x\sqrt{x} = \frac{3x}{2}$

$\Rightarrow \sqrt{x} = \frac{3}{2}$

$\Rightarrow \boxed{x = \frac{9}{4}}$

Hence, the correct answer is choice B.

Q19.(B) $(16)^{7/4}$

$= (2^4)^{7/4}$

$= 2^{4 \times 7/4}$

$= 2^7$

$= 128$

Hence, the correct answer is choice B.

Q20.(B) $\frac{4}{5}x - \frac{2}{3}x = 8$

$\Rightarrow 12x - 10x = 120$

$\Rightarrow 2x = 120$

$\Rightarrow x = 60$

Hence, the correct answer is choice B.

Hence, correct ...

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Square Root

Methods of Finding Square Root:

By Factors. Resolve the number into its prime factors. The square root is the product of the prime factors taken half as many times as they occur in the number.

For example, square root of 49 is 7 because

$$7^2 = 7 \times 7 = 49$$

The square root of a number is denoted by the symbol $\sqrt{\ }$, called the radical sign. Thus

$$\sqrt{49} = 7, \quad \sqrt{81} = 9 \text{ and } \sqrt{64} = 8$$

Note: $\sqrt{1} = 1$

Methods of Finding the Square Root:

Finding square root by factorization:

1. Find the prime factors of the given number.
2. Group the factors in pairs.
3. Take one number from each pair of factors and then multiply together.

Example 1:

Find the square root of the following:

(i) 52900 (ii) 4624

Solution:

(i) 52900

$$= \underline{2 \times 2} \times \underline{5 \times 5} \times \underline{23 \times 23}$$

$$\therefore \sqrt{52900} = 2 \times 5 \times 23 = 230$$

2	52900
2	26450
5	13225
5	2645
23	529
23	23
	1

(ii) 4624

$$= \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{17 \times 17}$$

$$\therefore \sqrt{4624} = 2 \times 2 \times 17$$

$$= 68$$

2	4624
2	2312
2	1156
2	578
17	289
17	17
	1

Multiple Choice Questions (MCQs)

Q1. If $\frac{250}{\sqrt{x}} = 10$, then $x =$

(A) 625 (B) 250
(C) 25 (D) None of these

Q2. If $\frac{\sqrt{y}}{200} = 0.02$, then $y =$

(A) 2 (B) 16
(C) 4 (D) 49

Q3. The square root of .09 is:

(A) 0.3 (B) 0.03
(C) 0.003 (D) 3

Q4. What is the value of $\sqrt{0.0009} + \sqrt{0.01}$?

(A) 13 (B) 1.3
(C) 0.13 (D) 0.013

Q5. $\sqrt{10} \times \sqrt{15}$ equals:

(A) $6\sqrt{5}$ (B) $3\sqrt{6}$
(C) $3\sqrt{5}$ (D) $5\sqrt{6}$

Q6. $\frac{1}{\sqrt{9} - \sqrt{8}}$ equals:

(A) $3 - 2\sqrt{2}$ (B) $3 + 2\sqrt{2}$
(C) $2 - 2\sqrt{3}$ (D) $3 - 2\sqrt{3}$

Q7. What is the value of $\sqrt[3]{0.00027}$?

(A) 3 (B) 0.03

(C) 0.3 (D) 0.003

Q8. After simplifying $\frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$, the answer is:

(A) $1+\sqrt{15}$ (B) $\sqrt{1-15}$
(C) $2-\sqrt{3}$ (D) $\sqrt{5}-\sqrt{3}$

Q9. If $\sqrt{3}=1.732$, then $\sqrt{12}=$

(A) 6.928 (B) 3.732
(C) 3.464 (D) 5.732

Q10. A gardener plants 17956 trees in such a way that there are as many rows as there are trees in a row. The number of trees in a row are:

(A) 136 (B) 134
(C) 154 (D) 144

Q11. If x and y are equal and $\sqrt{4\left(\frac{x^2}{3y}\right)}=1$, then what must be true for the value of y?

(A) y must be negative (B) y must be positive
(C) y must be equal to 4 (D) y may have any value

Q12. What is the smallest integer greater than $\sqrt{99}$?

(A) 3 (B) 9
(C) 10 (D) 50

Q13. If $r^3=343$, then $3r=$

(A) 7 (B) 21
(C) 49 (D) 39

Q14. Which shows $\sqrt{45}+\sqrt{245}-\sqrt{320}$ simplified completely?

(A) $-12\sqrt{5}$ (B) $-12\sqrt{2}$
(C) $2\sqrt{5}$ (D) $5\sqrt{2}$

Q15. Which shows $\sqrt{\frac{7}{12}}$ simplified completely?

(A) $\frac{\sqrt{7}}{12}$ (B) $\frac{\sqrt{14}}{12}$
(C) $\frac{\sqrt{21}}{12}$ (D) $\frac{\sqrt{21}}{6}$

Q16. If $p=\frac{\sqrt{3}-2}{\sqrt{2}+1}$, then which one of following equals $p-4$?

(A) $\sqrt{3}-2$ (B) $\sqrt{3}+2$
(C) 2 (D) $-2\sqrt{2}+\sqrt{6}-\sqrt{3}$

Q17. $\frac{4(\sqrt{6}+\sqrt{2})}{\sqrt{6}-\sqrt{2}}-\frac{2+\sqrt{3}}{2-\sqrt{3}}=$

(A) 1 (B) $\sqrt{6}-\sqrt{2}$
(C) $\sqrt{6}+\sqrt{2}$ (D) 8

Q18. A perfect square is a positive integer which when square rooted results in an integer. If $N=3^4 . 5^3 . 7$, then which is the biggest perfect square that is factor of N?

(A) 3^2 (B) 5^2
(C) $(9.5)^2$ (D) $(3.5.7)^2$

Q19. If $\sqrt{24}=4.899$, then the value of $\sqrt{\frac{8}{3}}$ is:

(A) 1.333 (B) 2.333
(C) 1.633 (D) 3.633

Q20. If $\sqrt{2}=1.4142$, then $\left(\frac{4+\sqrt{2}}{\sqrt{2}+1}\right)$ is equal to:

(A) 2.2426 (B) 3.5126
(C) 2.3462 (D) None of these

Q21. If $\sqrt{2}=1.4142$, then $\frac{\sqrt{2}}{2+\sqrt{2}}$ is equal to:

(A) 0.4142 (B) 2.4142
(C) $\frac{1}{0.4142}$ (D) None of these

Explanatory Answers

Q1. (A) Given that $\frac{250}{\sqrt{x}}=10$

$\Rightarrow 250=10\times\sqrt{x}$

$\Rightarrow (25)^2=(\sqrt{x})^2$

$\Rightarrow \quad x = 625$

Correct answer is choice A.

Q2. (B) Given that $\dfrac{\sqrt{y}}{200} = 0.02$

$\Rightarrow \quad \sqrt{y} = 0.02 \times 200$

$\Rightarrow \quad \sqrt{y} = \dfrac{2}{100} \times 200$

$\Rightarrow \quad \sqrt{y} = 2 \times 2 = 4$

$\Rightarrow (\sqrt{y})^2 = (4)^2$

$\Rightarrow \quad \boxed{y = 16}$

Correct answer is choice B.

Q3. (A) Given that $\sqrt{.09}$

$\Rightarrow \sqrt{\dfrac{9}{100}} \quad \Rightarrow \sqrt{\dfrac{(3)^2}{(10)^2}}$

$\Rightarrow \quad \dfrac{3}{10} = 0.3$

Correct answer is choice A.

Q4. (C) Given that $\sqrt{0.0009} + \sqrt{0.01}$

$\Rightarrow \sqrt{\dfrac{9}{10000}} + \sqrt{\dfrac{1}{100}}$

$\Rightarrow \sqrt{\dfrac{(3)^2}{(100)^2}} + \sqrt{\dfrac{(1)^2}{(10)^2}}$

$\Rightarrow \quad \dfrac{3}{100} + \dfrac{1}{10} \Rightarrow \dfrac{3+10}{100} = \dfrac{13}{100} = 0.13$

Correct answer is choice C.

Q5. (D) Given that $\sqrt{10} \times \sqrt{15}$

$= \sqrt{2\times5} \times \sqrt{3\times5}$

$= \sqrt{2\times3\times5\times5}$

$= \sqrt{2\times3\times5^2}$

$= 5\sqrt{6}$

Correct answer is choice D.

Q6. (B) Given that $\dfrac{1}{\sqrt{9}-\sqrt{8}}$

$= \dfrac{1}{\sqrt{(3)^2} - \sqrt{2\times2\times2}}$

$= \dfrac{1}{3-2\sqrt{2}}$

Multiplying and dividing by $3+2\sqrt{2}$

$$= \frac{1}{(3-2\sqrt{2})} \times \frac{3+2\sqrt{2}}{3+2\sqrt{2}} = \frac{3+2\sqrt{2}}{9-4(2)} = \frac{3+2\sqrt{2}}{9-8}$$

$$= \frac{3+2\sqrt{2}}{1} = 3+2\sqrt{2}$$

Correct answer is choice B.

Q7. (B) Given that $\sqrt[3]{0.000027}$

$$= \left(\frac{27}{1000000}\right)^{1/3}$$

$$= \frac{(3^3)^{1/3}}{(10^6)^{1/3}} = \frac{3^{3\times\frac{1}{3}}}{10^{6\times\frac{1}{3}}}$$

$$= \frac{3}{10^2} = \frac{3}{100}$$

$$= 0.03$$

Correct answer is choice B.

Q8. (A) Given that $\frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$

Multiplying numerator and denominator by $\sqrt{5}-\sqrt{3}$, we have

$$\frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}} = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}} \times \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}-\sqrt{3}}$$

$$= \frac{(\sqrt{5}-\sqrt{3})^2}{(\sqrt{5})^2-(\sqrt{3})^2} = \frac{5-3+2\sqrt{15}}{5-3}$$

$$= \frac{2+2\sqrt{15}}{2} = \frac{2(1+\sqrt{15})}{2}$$

$$= 1+\sqrt{15}$$

Correct answer is choice A.

Q9. (C) Given that $\sqrt{3} = 1.732$

As $\sqrt{12} = \sqrt{2\times2\times3}$

$= 2\sqrt{3}$

$= 2 \times 1.732$ $(\sqrt{3} = 1.732 \text{ given})$

$= 3.464$

Correct answer is choice C.

Q10. (B) Number of trees in a row $= \sqrt{17956}$

$= 134$

Correct answer is choice B.

Q11. (B) Because a negative number cannot have a real square root, the value under a square root sign must be positive. Thus, correct answer is choice B.

Q12. (C) Given that $\sqrt{99}$. Evaluating

$$\sqrt{99} = 9.9498$$

Clearly 10 is the smallest unit greater than the square root of 99. As $10 > 9.9498$.
Correct answer is choice C.

Q13.(B) Given that

$$r^3 = 343$$
$$r^3 = (7)^3$$
$$(r^3)^{1/3} = (7)^{3\times 1/3}$$
$$r = 7$$
$$\Rightarrow \boxed{3r = 21}$$

Q14.(C) Given that $\sqrt{45}+\sqrt{245}-\sqrt{320}$

$= \sqrt{3\times3\times5}+\sqrt{7\times7\times5}-\sqrt{2\times2\times2\times2\times2\times2\times5}$

$= 3\sqrt{5}+7\sqrt{5}-2\times2\times2\sqrt{5}$

$= 3\sqrt{5}+7\sqrt{5}-8\sqrt{5}$

$= \sqrt{5}(3+7-8)$

$= 2\sqrt{5}$

Correct answer is choice C.

5	245
7	49
	7

2	320
2	160
2	80
2	40
2	20
2	10
	5

Q15.(D) Given that $\sqrt{\frac{7}{12}}$. We can write it as $\frac{\sqrt{7}}{\sqrt{12}}$.

Rationalization

$$= \frac{\sqrt{7}}{\sqrt{12}}\times\frac{\sqrt{12}}{\sqrt{12}} = \frac{\sqrt{7\times12}}{\sqrt{12\times12}}$$
$$= \frac{\sqrt{7\times3\times2\times2}}{12} = \frac{2\sqrt{21}}{12}$$
$$= \frac{\sqrt{21}}{6}$$

Correct answer is choice D.

Q16.(D) Given that $p = \frac{\sqrt{3}-2}{\sqrt{2}+1}$

Rationalization

$$\frac{\sqrt{3}-2}{\sqrt{2}+1}\times\frac{\sqrt{2}-1}{\sqrt{2}-1}$$
$$= \frac{\sqrt{3\times2}-2\sqrt{2}-\sqrt{3}+2}{(\sqrt{2})^2-(1)^2}$$
$$= \frac{\sqrt{6}-2\sqrt{2}-\sqrt{3}+2}{2-1} = \sqrt{6}-2\sqrt{2}-\sqrt{3}+2$$

Now
$$p-4 = \sqrt{6}-2\sqrt{2}-\sqrt{3}+2-4$$
$$= \sqrt{6}-2\sqrt{2}-\sqrt{3}-2$$
$$= -2\sqrt{2}+\sqrt{6}-\sqrt{3}-2$$

Correct answer is choice D.

17.(A) Given that $\frac{4(\sqrt{6}+\sqrt{2})}{\sqrt{6}-\sqrt{2}}-\frac{2+\sqrt{3}}{2-\sqrt{3}}$

Let's rationalize both fractions by multiplying top and bottom of each fraction by its conjugate of its denominator.

$$\frac{\sqrt{6}+\sqrt{2}}{\sqrt{6}-\sqrt{2}} = \frac{\sqrt{6}+\sqrt{2}}{\sqrt{6}-\sqrt{2}} \times \frac{\sqrt{6}+\sqrt{2}}{\sqrt{6}+\sqrt{2}}$$

$$= \frac{(\sqrt{6}+\sqrt{2})^2}{(\sqrt{6})^2-(\sqrt{2})^2}$$

$$= \frac{6+2+4\sqrt{3}}{6-2} = \frac{8+4\sqrt{3}}{4} = \frac{4(2+\sqrt{3})}{4}$$

$$= 2+\sqrt{3}$$

Thus $\frac{4(\sqrt{6}+\sqrt{2})}{\sqrt{6}-\sqrt{2}} = 4(2+\sqrt{3}) = 8+4\sqrt{3}$

Now $\frac{2+\sqrt{3}}{2-\sqrt{3}} = \frac{2+\sqrt{3}}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}}$

$$= \frac{(2+\sqrt{3})^2}{(2)^2-(\sqrt{3})^2} = \frac{4+3+4\sqrt{3}}{4-3}$$

$$= \frac{7+4\sqrt{3}}{1} = 7+4\sqrt{3}$$

Hence, $\frac{4(\sqrt{6}+\sqrt{2})}{\sqrt{6}-\sqrt{2}} - \frac{2+\sqrt{3}}{2-\sqrt{3}} = 8+4\sqrt{3}-7-4\sqrt{3}$

$$= 1$$

Correct answer is choice A.

Q18.(C) Here, Given that $N = 3^4 \cdot 5^3 \cdot 7$

Writing N as a product of perfect square yields $(3^4 \cdot 2^5) \cdot 5 \cdot 7 = (3^2 \cdot 5)^2 \cdot 5 \cdot 7 = (9 \cdot 5)^2$ ...

Hence, $(9 \cdot 5)^2$ is the biggest perfect square factor of N.

The correct choice is C.

Q19.(C) Given that $\sqrt{24} = 4.899$

$$\sqrt{\frac{8}{3}} = \frac{\sqrt{8}}{\sqrt{3}}$$

$$\frac{\sqrt{8}}{\sqrt{3}} = \frac{\sqrt{8}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{\sqrt{24}}{\sqrt{3\times 3}}$$

$$= \frac{\sqrt{24}}{3} = \frac{4.899}{3}$$

$$= 1.633$$

Hence, the correct answer is C.

Q20.(A) Given that $\frac{4+\sqrt{2}}{\sqrt{2}+1}$

$$\therefore \quad \frac{4+\sqrt{2}}{\sqrt{2}+1} = \frac{4+\sqrt{2}}{\sqrt{2}+1} \times \frac{\sqrt{2}-1}{\sqrt{2}-1}$$

$$= \frac{(4+\sqrt{2})(\sqrt{2}-1)}{(\sqrt{2})^2-(1)^2} = \frac{4\sqrt{2}+2-4-\sqrt{2}}{2-1}$$

$$= \frac{4\sqrt{2} - \sqrt{2} - 2}{1} = 3\sqrt{2} - 2$$
$$= 3(1.4142) - 2$$
$$= 4.2426 - 2$$
$$= 2.2426$$

Correct answer is choice A.

Q21.(A) Given that $\frac{\sqrt{2}}{2+\sqrt{2}}$

$$\therefore \quad \frac{\sqrt{2}}{2+\sqrt{2}} = \frac{\sqrt{2}}{2+\sqrt{2}} \times \frac{2-\sqrt{2}}{2-\sqrt{2}}$$
$$= \frac{2\sqrt{2} - \sqrt{2\times 2}}{(2)^2 - (\sqrt{2})^2} = \frac{2\sqrt{2}-2}{4-2} = \frac{2\sqrt{2}-2}{2}$$
$$= \frac{2(\sqrt{2}-1)}{2} = \sqrt{2} - 1$$
$$= 1.4142 - 1 = 0.4142$$

Correct answer is choice A.

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Fractions & Decimals

FRACTIONS:

If any unit be divided into any number of equal parts, one or more of these parts is called a fraction of the unit.

Example: The fractions one-fourth, two-third and three-fourth are respectively written as $\frac{1}{4}, \frac{2}{3}$ and $\frac{3}{4}$.

NUMERATOR AND DENOMINATOR:

The upper number, which shows the number of parts taken to form the fraction, is called numerator.

The lower number, which indicates the number of equal parts in which the unit is divided, is called denominator.

Terms of the Fraction:

The numerator and the denominator of a fractions are called its terms.

Note: A fraction is also called a rational number.

Lowest Terms of a Fraction:

When the numerator and the denominators of a fraction have no common factor, the fraction is said to be is its lowest terms:

Example: $= \frac{6}{10} = \frac{3\times 2}{5\times 2}$

In the above example, denominator and the numerator have a common factor, thus $\frac{6}{10}$ is not is its lowest terms. If we cancel out 2 by dividing numerator and denominator by 2, we find $\frac{3}{5}$, which has no common factor. Hence $\frac{3}{5}$ is in its lowest terms.

Proper Fraction:

A proper fraction is one whose numerator is less than the denominator.

Example: $\frac{2}{3}, \frac{5}{7}, \frac{23}{46}$ are proper fractions.

Note: The value of proper fractions is always less than 1.

Multiple Choice Questions (MCQs)

Q1. If $\frac{5}{x}, \frac{8}{x}$, and $\frac{13}{x}$ are all in lowest terms. Then how many integers, x, between 30 and 40?

(A) 5 (B) 1
(C) 2 (D) 3
(D) None of these

Q2. $\frac{6}{6} \times \frac{6}{12} \times \frac{6}{18} \times \frac{6}{24} \times \frac{6}{30}$ equals:

(A) $\frac{1}{120}$ (B) $\frac{1}{2}$
(C) $\frac{1}{30}$ (D) 1
(D) None of these

Q3. If $\frac{4}{13}$ of a number is 39, what is $\frac{8}{13}$ of that number?

(A) $\frac{39}{4}$ (B) 78
(C) 16 (D) $\frac{39}{8}$

Q4. $\frac{3}{4}$ of 28 is equal to $\frac{7}{30}$ of what number?

(A) 90 (B) 45
(C) 30 (D) 56

Q5. Which of the following is less than $\frac{5}{11}$?

(A) $\frac{3}{2}$ (B) $\frac{2}{3}$
(C) $\frac{1}{2}$ (D) $\frac{2}{5}$

Q6. There are 20 boys in a class. Five of them are left-handed. What fraction of the class is left-handed?

(A) $\frac{1}{5}$ (B) $\frac{1}{2}$
(C) $\frac{1}{4}$ (D) $\frac{2}{11}$

Q7. A chemical solution contains 8% of acid. If there is 15 ml of acid, what is the volume of the solution?

(A) 125.5 mL (B) 187.5 mL
(C) 225.5 mL (D) 171.5 mL

Q8. What fractional part of a week is 98 hours?

(A) $\frac{7}{98}$ (B) $\frac{7}{12}$
(C) $\frac{1}{20}$ (D) $\frac{1}{7}$

Q9. A village has 5860 voters, of whom 7% usually forget to vote. In order to win an election, a candidate must gain at least 50% of the remaining votes. How many votes does he need in order to win?

(A) 2725 (B) 410
(C) 5450 (D) None of these

Q10. What fraction is exactly midway between $\frac{1}{3}$ and $\frac{1}{4}$?

(A) $\frac{7}{12}$ (B) $\frac{7}{24}$
(C) $\frac{29}{11}$ (D) $\frac{1}{2}$

Q11. $\frac{4}{9}$ of a number is 12. What is the number?

(A) 27 (B) 36
(C) 18 (D) 16

Q12. Ali purchased some goldfish. During the first week, $\frac{1}{5}$ of them died, and during the second week, $\frac{3}{8}$ of those still alive at the end of the first week died. What is the fraction of the original goldfish still alive after two weeks?

(A) $\frac{1}{2}$ (B) $\frac{3}{2}$
(C) $\frac{5}{2}$ (D) $\frac{4}{3}$

Q13. $\frac{3}{8}$ of a number is 10. What is the number?

(A) 91 (B) 81
(C) 23 (D) 27

Q14. $\frac{5}{8}$ of 24 is equal to $\frac{15}{7}$ of what number?

(A) 15 (B) 105

(C) 35 (D) 7

Q15. A German class has 12 boys and 18 girls. What is the fraction of the class boys?

(A) $\frac{1}{6}$ (B) $\frac{3}{5}$ (C) $\frac{2}{3}$ (D) $\frac{2}{5}$

Explanatory Answers

Q1. (D) If x is even, then $\frac{8}{x}$ will not be in lowest term. This is because, both x and 8 are divisible by 2.

Now we take the odd number between 30 and 40, these are 31, 33, 35, 37, 39. In these numbers, we see that 35 and 39 are divisible by 5 and 13, respectively. Thus only 31, 33 and 37 are required numbers.

Q2. (A) Simplifying $\frac{6}{6}\times\frac{6}{12}\times\frac{6}{18}\times\frac{6}{24}\times\frac{6}{30}$

$\frac{1}{1}\times\frac{1}{2}\times\frac{1}{3}\times\frac{1}{4}\times\frac{1}{5}=\frac{1}{20}$

Q3. (B) As $\frac{4}{13}$ of a number is 39. Therefore, the $\frac{8}{13}$ of that number will be 78.

Because $\frac{8}{13}=\frac{4}{13}\times 2$, and $\frac{4}{13}$ of a number is 39, therefore, double of $\frac{4}{13}\left(\frac{4}{13}\times 2=\frac{8}{13}\right)$ should be equal to $39\times 2=78$.

Q4. (A) Let x be the required number, then by given condition

$$28\div\frac{4}{3}=x\div\frac{30}{7}$$

$$28\times\frac{3}{4}=x\times\frac{7}{30}$$

$$21=x\times\frac{7}{30}$$

$$\frac{21\times 30}{7}=x$$

$$\Rightarrow \boxed{x=90}$$

Q5. (D)

Q6. (C) Left-handed $=5$

Total $=20$

So, fraction $=\frac{5}{20}=\frac{1}{4}$

Q7. (B) 8 mL acid in solution $=100$ mL

1 mL acid in solution $=\frac{100}{8}=12.5$ mL

15 mL acid in solution $=12.5\times 15$

$=187.5$ mL

Q8. (B) There are 7 days in a week, and each day has 24 hours. Therefore, hours in a week $=24\times 7=168$

The required fraction is: $\frac{98}{168}=\frac{7}{12}$

Q9. (A) People does not give vote $=\frac{7}{100}\times 5860$

$= 7 \times 58.6$
$= 410.2$

People does not give vote $\cong 410$ people

Remaining people $= 5860 - 410$
$= 5450$ people

Candidate must gain vote $= 5450 \times \frac{50}{100}$
$= 2725$ vote

Q10. (B) The midway fraction of the fractions $\frac{1}{3}$ and $\frac{1}{4} = \frac{1}{2}\left(\frac{1}{3}+\frac{1}{4}\right) = \frac{1}{2}\left(\frac{7}{12}\right) = \frac{7}{24}$.

Q11. (A) Let the required number be "x", then according to given condition $\frac{4}{9} \times x = 12 \Rightarrow x = \frac{12}{\frac{4}{9}}$

$= 12 \times \frac{9}{4} = 27$

Q12. (A) Let the number of fish purchased $= x$

During first week (died fish) $= \frac{1}{5} \times x = \frac{x}{5}$

Still alive $= x - \frac{1}{5}x = \frac{4}{5}x$

During second week (died fish) $= \frac{4}{5}x \times \frac{3}{8} = \frac{3}{10}x$

Fish at the end of two weeks $= \frac{4x}{5} - \frac{3x}{10} = \frac{8x-3x}{10} = \frac{5x}{10} = \frac{1}{2}x$

So fraction $= \frac{\frac{1}{2}x}{x} = \frac{1}{2}$

Q13. (D) Let the number $= x$

Then $\frac{3}{8} \times x = 10$

$\Rightarrow x = \frac{80}{3}$

$\Rightarrow x = 26.67 = \boxed{27}$

Q14. (D) Let the number $= x$

Then $\frac{15}{7} \times x = \frac{5}{8} \times 24$

$\Rightarrow \frac{15 \times x}{7} = 15$

$\Rightarrow x = \frac{7 \times 15}{15} = \boxed{7}$

Q15. (D) No. of boys $= 12$

No. of girls $= 18$

Total $= 12 + 18 = 30$

Required fraction $= \frac{12}{30} = \boxed{\frac{2}{5}}$

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Percentage

Percentage:

The term 'percent' is a short form of the Latin word 'per centum' meaning 'out of hundred'. It can best be defined as:

"A fraction whose denominator is 100 is called a percentage and the numerator of the fraction is called the rate percent."

A rate percent is reduced to an equivalent fraction dividing it by 100.

Change of percentage into Fraction or Decimal:

To convert a percentage to a fraction, mixed number or decimal, divide it by 100, and reduce, if possible. If necessary, the relating fraction may then be changed to a decimal.

Example 1:

(i) Express $2\frac{1}{7}\%$ to a fraction

(ii) Change $\frac{3}{4}\%$ to a decimal.

Solution:

(i) $2\frac{1}{7}\% = \frac{15}{7}\%$

$= \frac{15}{7} \times \frac{1}{100} \left(\text{Replace \% by } \frac{1}{100}\right)$

$= \frac{3}{140}$

(ii) $\frac{3}{4}\% = \frac{3}{4} \times \frac{1}{100} \left(\text{Replace \% by } \frac{1}{100}\right)$

$= \frac{3}{400} = .0075$

Multiple Choice Questions (MCQs)

Q1. If the base of a rectangle is increased by 40% and its altitude is decreased by 20%, then its area is:

(A) decreased by 20% (B) increased by 12%
(C) decreased by 12% (D) increased by 16%

Q2. If x% of y is 20, then y =

(A) $2000x$ (B) $\frac{100}{x}$
(C) $\frac{2000}{x}$ (D) $\frac{x}{200}$

Q3. 12 is $\frac{1}{3}$% of what number?

(A) 4 (B) 400
(C) 36 (D) 3600

Q4. If p is a positive number, 400% of p is what percent of 400 p?

(A) 4 (B) 25
(C) 40 (D) 1

Q5. What is 10% of 30% of 40%?

(A) 0.12% (B) 0.012%
(C) 12% (D) 1.2%

Q6. What percent of 75 is x?

(A) $\frac{3}{4}-x$ (B) $\frac{4}{3}x$
(C) $4x$ (D) $3x$

Q7. If 35 students took an exam and 13 of

them failed, what percent of them passed?

(A) 20% approx (B) 63% approx
(C) 25% approx (D) 22% approx

Q8. There are twice as many boys as girls in an economics class. If 20% of the boys and 35% of the girls have already handed over their result cards, what percent of the students have not yet handed over their cards?

(A) 75 (B) 65
(C) 55 (D) 15

Q9. A dealer bought an ornamental jar for Rs. 7,000 and after some days sold it for Rs. 21,000. By what percent did the value of jar increase?

(A) 300 (B) 200
(C) 150 (D) 20

Q10. On a test consisting of 60 problems, Sonia solved 75% of first 40 problems correctly. What percent of the other 20 questions does she need to solve correctly for her grade on the entire exam to be 90%?

(A) 95% (B) 65%
(C) 85% (D) cannot achieve 90%

Q11. If 60% of A is 30% of B, then B is what percent of A?

(A) 300% (B) 30%
(C) 200% (D) 3%

Q12. What percent of p is q?

(A) $\frac{q}{p}$ (B) $\frac{q}{p}$
(C) $\frac{100q}{p}$ (D) $\frac{100p}{q}$

Q13. What percent of $\frac{1}{2}$ is $\frac{5}{4}$?

(A) 2.5 (B) 1.5
(C) 250 (D) 150

Q14. In a school of 820 students, 55% are boys. The number of girls and the number of boys are:

(A) 369 boys, 451 girls (B) 281 boys, 539 girls
(C) 539 boys, 281 girls (D) 451 boys, 369 girls

Q15. Jafer drew a square. He then erased it and drew a second square whose sides were 3 times the sides of the first square. By what percent was the area of the square increased?

(A) 300% (B) 800%
(C) 400% (D) 200%

Q16. A team has won 60 percent of the 30 games for all this season. If the team plays a total 50 games all season and wins 80 percent of the remaining games, how many games will the team win for the entire season?

(A) 36 (B) 25
(C) 42 (D) 39

Q17. Local telephone calls increased in price from 25 Pa to 30 Pa. What percentage increase was this?

(A) 15% (B) 25%
(C) 5% (D) 20%

Q18. A worker pays Rs. 350 tax per month, which is 15% of his income. What is his income?

(A) 3500 (B) 5250
(C) 2333.33 (D) 2523.30

Q19. If "x" is a positive number, 400% of x is what percent of $400x$?

(A) 1 (B) 0.1
(C) 0.01 (D) 100

Q20. Babar gave 15% of his baseball cards to Laeeq and 20% to Sarfraz. If he still had 520 cards, how many did he have originally?

(A) 800 (B) 720
(C) 820 (D) 600

Q21. A certain country has an infant mortality rate of 6.8% of 20000 babies born in a certain year, how many survived?

(A) 1360 (B) 18640
(C) 18000 (D) 17640

Q22. 20% of 50% of 80 is:

(A) 40 (B) 16
(C) 8 (D) 60

Q23. The price of a can of acid was increased by 20%. How many cans can be purchased for the amount of money that used to buy 300 cans?

(A) 250 (B) 320
(C) 150 (D) 240

Q24. In a basket containing 180 pears, 9 pears are spoiled. What percent of the pears in the basket are not spoiled?

(A) 85% (B) 5%
(C) 95% (D) 9%

Q25. A silo (container for storing grain) is filled to capacity with p kilograms of wheat. Rats eats q kilograms a day. After 21 days, what percentage of the silo's capacity have the rats eaten?

(A) $\frac{21q}{30p} \times 100$ (B) $\frac{q}{p} \times 100$

(C) $\frac{21q-p}{p} \times 100$ (D) $2100\left(\frac{q}{p}\right)$

Q26. A factory normally employs 100 people. During a slow spell, it fired 20% of its employees. By what percentage must it now increase its staff to return to full capacity?

(A) 25% (B) 20%
(C) 80% (D) 40%

Q27. Six students in a class failed in geometry. This represents $16\frac{2}{3}\%$ of the class. How many students passed the course?

(A) 36 (B) 30
(C) 42 (D) 24

Q28. If 30% of all women are voters and 42% of the population are women, what percent of the population are women voters?

(A) 17.4% (B) 25.20%
(C) 12.60% (D) None of these

Q29. If the length of the rectangle is increased by 16% and the width is decreased by 25%, then the area:

(A) increases by 9% (B) decreases by 41%
(C) decreases by 13% (D) increases by 59%

Q30. If the base of a rectangle is increased by 40% and the altitude is decreased by 30%, the area is:

(A) increased by 10% (B) increased by 12%
(C) decreased by 10% (D) decreased by 2%

Explanatory Answers

Q1. (B) If the value firstly increased by $x\%$ and then decreased by $y\%$ then there is $\left[x-y-\frac{xy}{100}\right]\%$ increase or decrease according as the sign +ve or −ve, respectively. In this problem, $x = 40$ and $y = 20$. Therefore,

$$\left[40-20-\frac{(40)(20)}{100}\right]\%$$

$$\left[20-\frac{800}{100}\right]\%$$

$[20 - 8]\% = 12\%$

Because sign is +ve, therefore, its area is increased by 12%.

Q2. (C) $y \times \frac{x}{100} = 20$

$\Rightarrow xy = 20 \times 100 \quad \Rightarrow xy = 2000$

$\Rightarrow y = \frac{2000}{x}$

Q3. (D) Using, $\frac{\text{Part}}{\text{Whole}} = Y$ percent, here $P = 12$, W = ? and Y percent $= \frac{1}{300}$

$\frac{P}{W} = \frac{Y}{100} \quad \Rightarrow \quad \frac{P}{W} = Y \times \frac{1}{100}$

$\frac{12}{W} = \frac{1}{3} \times \frac{1}{100} \quad \Rightarrow \quad W = 3 \times 1200 = 3600$

Q4. (D) 400% of $p = \frac{400}{100} \times p = 4p$, which is 1% of 400 p.

Q5. (D) 30% of 40% $= \frac{30}{100} \times \frac{40}{100} = \frac{12}{100} = 0.12$

Now 10% of 30% of 40% $= \frac{10}{100} \times 0.12 = 0.012 = 1.2\%$

Q6. (B) $\frac{P}{W} = \frac{y}{100} \Rightarrow x = \frac{y}{100} \times 75$

$\Rightarrow x = \frac{3y}{4} \Rightarrow y = \frac{4x}{3}$

Q7. (B) If 13 students failed, then the number of passed students = 35 – 13 = 22

Thus, $\frac{22}{35} \times 100 = 63\%$ approx.

Q8. (A) Let the number of girls = 100, then

Number of boys = 200

Then 35 girls (35% of 100) and 40 boys (20% of 200), have handed in their cards. Hence 75 of 300 (100 + 200) students have handed them in. It means that 300 – 75 = 225 have not handed them in. Thus

$\frac{225}{300} \times 100 = 75\%$

Q9. (B) The increment in the value of the jar = Rs. 21000 – Rs. 7000 = Rs. 14000

The %age increase in the value of the jar

$= \frac{\text{Increment}}{\text{Actual}} \times 100$

$= \frac{14000}{7000} \times 100 = 200\%$

Q10.(D) To achieve 90% grade on the entire examination, Sonia needs 54 (as calculated below) problems

$$\frac{P}{W} = y\% \Rightarrow \frac{P}{60} = \frac{90}{100} \Rightarrow P = \frac{90}{100} \times 60$$
$$\Rightarrow P = 54$$

to solve correctly. So far she has solved 30 $\left(\frac{P}{40} = \frac{75}{100} \Rightarrow P = \frac{75}{100} \times 40 = 30\right)$ problems correctly. Therefore, on the last 20 problems she needed 54 – 30 = 24 correct answers, which is impossible to get from 20 problems.

Q11.(C) 60% of A is 30% of B, *i.e.,* $\frac{60}{100}A = \frac{30}{100}B.$

$\Rightarrow .60A = .30B, \Rightarrow B = \frac{.60}{.30}A \Rightarrow B = 2A$

Now we find B is what percent of A. *i.e.,*

$B = \frac{x}{100}A$ or $B = (x\%)(A)$

$\Rightarrow B = (200\%)A$

Q12.(A) Using the relation $\frac{\text{Part}}{\text{Whole}} = y\%$

$\frac{q}{p} = y\%$

Second Method: What % p is q

x % p = q

$\Rightarrow x\% \quad = \frac{q}{p}$

Q13.(C) Using $\frac{\text{Part}}{\text{Whole}} = y\%$

$\frac{5}{4} \div \frac{1}{2} = y\%$

$\frac{5}{4} \times 2 = y\% \quad \Rightarrow y\% = \frac{5}{2} = 2.5$

$\Rightarrow y\% = 250\%$

Q14. (D) Total No. of students $= 820$

No. of boys $= 820 \times \frac{55}{100} = 451$ boys

No. of girls $= 820 - 451 = 369$ girls

Q15. (B)

Let the length of first square $= 1$ inch

Then Area of first square $= 1$ square inch

Then sides of the second square $= 3$ inch

Area of the second square $= 9$ square inch

$\therefore$ Increase in the area of the 2nd square $= 8$ square inches

%age increase in the second square $= \boxed{800\%}$

Q16. (A) Total No. of games that

the team has won so far $= \frac{60}{100} \times 20 = 12$ games

The total number of games left $= 50 - 20 = 30$

80% of 30 games will the team win

$\therefore \quad \frac{80}{100} \times 30 = 24$ games

The total number of wins $= 12 + 24 = \boxed{36}$

Q17. (D) Increase in local call $= 30 - 25 = 5$Pa

% increase $= \frac{5}{25} \times 100 = 20\%$

Q18. (C) Let "x" be his income then

15% of $x = 350$

$x = 350 \div 15\% = 350 \times \frac{100}{15}$

$x = 2333.33$

Q19. (A) 400% of $x = 4x$. Which is 1% of $400x$.

Q20. (A) Actually, Babar had 100% of the cards. After distributing 35% (20% + 15%) of them, he had 100% − 35% = 65% of them left. So

$520 = \frac{65}{100} x \Rightarrow x = \frac{520 \times 100}{65} = \boxed{800}$

Q21. (B) Infant mortality $= 20000 \times \frac{6.8}{100} = 1360$

survived bodies $= 20000 - 1360 = \boxed{18640}$

Q22. (C) 50% of 80 $= 80 \times \frac{50}{100} = 40$

20% of 40 $= 40 \times \frac{20}{100} = \boxed{8}$

Q23. (A) Let the can of acid used to cost Rs. 1

After increasing 20% cost, it became $= 1 + \frac{1}{20} = 1.20$

Then 300 cans of acid used to cost = Rs. 300

Each can be bought for Rs 300

$\therefore 300 \div 1.20 = \boxed{250}$

Q24. (C) The pears that are not spoiled $= 180 - 9 = 171$

Percentage $= \frac{171}{180} \times 100$

$= 19 \times 5$

$= 95\%$

Q25. (D) After 21 days the rats have eaten wheat = 21q kilograms.

So, the required fraction in percentage $= \frac{21q}{p} \times 100$

$= 2100\left(\frac{q}{p}\right)$

Q26. (A) 20% of 100 = 20 employee

employees left = 100 – 20 = 80 employees

If it again increases by 20, the percentage of increase

$= \frac{20}{80} \times 100 = 25\%$

Q27. (B) Let x be the number of students, then

$16\frac{2}{3}\% = \frac{1}{6} \Rightarrow \frac{1}{6}x = 6$

$\Rightarrow x = 36$

36 students in class, 6 failed, 30 passed

Q28. (C) 30% of the 42% of the population who are women are voters so

$(.30)(.42) = 0.126 = 12.60\%$ of the population are women voters.

Q29. (C) Let L be the original length and W be the original width.

The new length= $100\% + 16\% = 116\%$ of L $\Rightarrow \boxed{1.16L}$

Since the width decreases by 25% so the new width is 75% of W $\Rightarrow$ .75W

Area = LW

$\Rightarrow$ New Area $= (1.16)(.75)LW$

$= 0.87\ LW = 87\%$ of Area

Since the area is 87% of the original area. Thus the area has decreased by $(100 - 87) = 13$

Q30. (D) Let "b" be the base and "a" altitude. Then the new base will be $(b + 0.4b)$. The new altitude after decreasing 30% is $(a - 0.3a)$.

So the area is

$((a - .3a)(b + 0.4b) = (0.7)(1.4)ab$

$= 0.98ab$

The new area is 42% of the old. So the new area (98% – 100%)

= −2% is decreased by 2%

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Ratio & Proportion

RATIO:

The number of times one quantity contains another quantity of the same kind is called the ratio of the two quantities.

Note: The ratio of two quantities is equivalent to the fraction that one quantity is to the other.

Example: There can be ratio between Rs. 30 and Rs. 40, but there can be no ratio between Rs. 30 and 40 apples.

Remember: The ratio 3:5 is written as 3:5 or $\frac{3}{5}$, 3 and 5 are called the terms of the ratio. 3 is the first and 5 is the second term.

Note: The first term of a ratio is called the antecedent and the second the consequent.

If a set of objects is divided into two groups in the ratio $a : b$, then the first group contains $\frac{a}{a+b}$ of the total objects. The second group contain $\frac{b}{a+b}$ of the total number of objects.

Important Example:

If a bag containing twelve mirrors is dropped, which of the following cannot be the ratio of the broken mirrors to unbroken mirrors?

(i) 2: 1 ii) 3:1 iii) 3:2 iv) 1:1 v) 7:5

Solution:

Since there are 12 mirrors is the bag. So 12 must be divisible by the sum of terms in the ratio exactly. We see that 2+1=3 divides 12 exactly 3+1=4 also divides exactly. Only the ratio 3+2=5 doesn't divide 12 exactly. Thus the correct answer is (iii).

PROPORTION:

The equality of ratios is called proportions.

Example:

Consider the two ratios

1st ratio	2nd ratio
5:15	7:21

Since 5 is one-third of 15, and 7 is one-third of 21, the two ratios are equal.

Note: The first and fourth terms are called extremes, and the second and third terms are called the means. In above example, 5 and 21 are extremes, while 15 and 7 are means.

Multiple Choice Questions (MCQs)

Q1. In a city 90% of the population own a car, 15% own a motorcycle, and everybody owns one or the other or both. What is the percentage of motorcycle owners to who own cars?

(A) 15% (B) 5%

(C) 75% (D) $33\frac{1}{3}$%

Q2. Concrete consists of cement, sand and screenings in the ratio of 1 : 5 : 4, what is the percentage of the sand mixed?

(A) 10% (B) 40%

(C) 50% (D) 60%

Q3. Three business partners shares have profit of Rs. 24000 in the ratio 5 : 4 : 3. What is the amount of the least share?

(A) 6000 (B) 8000

(C) 10,000 (D) 1200

Q4. A machine produces 1280 parts in 16 hours. How many parts would it make in a working week of 44 hours?

(A) 2530 (B) 3520
(C) 2122 (D) 3960

Q5. If the ratio of x and y is $\frac{11}{3}$, what is the value of $2x$ to y?

(A) $\frac{11}{6}$ (B) $\frac{22}{6}$
(C) $\frac{22}{3}$ (D) $\frac{11}{5}$

Q6. If 80% application to a program were rejected, what is the ratio of the number accepted to the number rejected?

(A) 1 : 4 (B) 4 : 1
(C) 1 : 8 (D) 3 : 8

Q7. What is the ratio of the circumference of a circle to its radius?

(A) π (B) $\frac{\pi}{2}$
(C) $2\pi r$ (D) 2π

Q8. Win/Loss ratio for two teams are A, 5 : 2 and B, 7 : 3 which team has the better record?

(A) A (B) B
(C) both A and B (D) wrong question

Q9. If 15 workers can paint a certain number of houses in 24 days, how many days will 40 workers take, working at the same rate, to do the same job?

(A) 12 days (B) 18 days
(C) 15 days (D) 9 days

Q10. If a jet travels 1280 km in 2 hours, how far will it travel in $5\frac{1}{2}$ hours, at the same speed?

(A) 2100 (B) 3300
(C) 2700 (D) 3520

Q11. If the ratio of $a : b$ is $9 : 7$ then $a + b$ is:

(A) 14 (B) 16
(C) 63 (D) not possible

Q12. If you can buy A apples for n nickels (five cent coin), how many apples can you buy for d dimes and q quarters?

(A) $\frac{A(d+q)}{n}$ (B) $\frac{A}{n}(10d+25q)$
(C) $\frac{A}{n}(2d+5q)$ (D) $\frac{d+q}{An}$

Q13. If the ratio of boys and girls in a class is 3 : 5 and the class contains 24 students, how many additional boys would have to enroll to make the ratio of boys to girls 1:1?

(A) 9 (B) 15
(C) 6 (D) 12

Q14. A recipe requires 13 gram of sugar and 18 gram of flour. If only 100 gram of sugar is used, how much flour, to the nearest gram, should be used?

(A) 167.3 (B) 138.13
(C) 144.5 (D) 178.12

Q15. Green paint is obtained from blue and yellow paint in the ratio 3 : 5. How much of each colour is needed to make 40 litres of this green paint?

(A) Blue paint: 15 litres, yellow paint: 25 litres (B) Blue paint: 25 litres, yellow paint: 15 litres
(C) Blue paint: 10 litres, yellow paint: 30 litres (D) Blue paint: 13 litres, yellow paint: 27 litres

Explanatory Answers

Q1. (D) Let x stand for the percentage who own both a car and a motorcycle. Then

(The %age who own a motorcycle) + (The %age who own a car) – (The %age who own one or the other or both) = 100% own one or other or both.

$$\therefore \quad 15\% + 90\% - A = 100\%$$

$$\Rightarrow \quad 105\% - A = 100\% \Rightarrow \boxed{A = 5\%}$$

The %age of motorcycle owners to who own car is

$$= \frac{5\%}{15\%} = \frac{1}{3} = \boxed{33\frac{1}{3}\%}$$

Q2. (C)

$$\text{Ratio} = 1:5:4$$
$$\text{Sum of ratio} = 1+5+4=10$$
$$\text{Sand} = \frac{5}{10}\times 100 = 50\%$$

Q3. (A)

$$\text{Ratio} = 5:4:3$$
$$\text{Sum of ratio} = 5+4+3=12$$
$$\text{least share} = \frac{3}{12}\times 24000$$
$$= \text{Rs. } 6000$$

Q4. (B) Let "x" be the number of parts in 44 hours

Then $16 : 1280 :: 44 : x$

$$\Rightarrow \frac{16}{1280} = \frac{44}{x} \Rightarrow x = \frac{44\times 1280}{16}$$
$$x = \boxed{3520}$$

Q5. (C) The ratio of x to y can be written as $\frac{x}{y}$. The ratio of x to y is $\frac{11}{3}$, which can be written as $\frac{x}{y}=\frac{11}{3}$

If $\frac{x}{y}=\frac{11}{3}$, then $2\left(\frac{x}{y}\right) = 2\left(\frac{11}{3}\right)$

$$\frac{2x}{y} = \boxed{\frac{22}{3}}$$

Q6. (A) Since 80% of the application were rejected. Therefore, 20% = (100% – 80%) were accepted, the ratio of accepted to rejected is

20% : 80% = 1 : 4

Q7. (D) The ratio of the circumference to the diameter of the circle is π. Therefore,

$$\pi = \frac{C}{d} \Rightarrow \frac{C}{2r} \Rightarrow 2\pi = \frac{C}{r}$$

Q8. (A)

A	B
$5:2$	$7:3$
$=\frac{5}{2}:1$	$=\frac{7}{3}:1$
$2.5:1$	$=2.3:1$

Team A has the better record.

Q9. (D) Clearly, the more workers are there, the less time will be required, therefore, $15 : 40 :: \frac{1}{24} : \frac{1}{x}$

$$\Rightarrow \frac{15}{40} = \frac{x}{24} \quad \Rightarrow x = \frac{15\times 24}{40} = 9 \text{ days}$$

Q10. (D) It's a direct variation question

$$1280 : 2 :: x : \frac{11}{2}$$

$$\frac{1280}{2} = \frac{x}{11/2} \quad \Rightarrow 2x = \frac{1280\times 11}{2}$$
$$\Rightarrow x = 3520 \text{ km}$$

Q11. (D) In this question, if a is 18 and b is 14, then the ratio a : b is 9 : 7 but a + b = 32. The point in

this question that a and b can take on many possible values. It is not possible here to establish the definite value for the sum of a and b.

Q12. (C) $\frac{\text{A apples}}{\text{n nickels}} = \frac{\text{A apples}}{\text{5n cents}} = \frac{\text{x apples}}{(10d + 25q)\text{cents}}$

$$\Rightarrow \frac{A}{5n} = \frac{x}{10d + 25q} \qquad \Rightarrow 5nx = A(10d + 25q)$$

$$\Rightarrow \quad x = \frac{A5(2d + 5q)}{5n}$$

$$\Rightarrow \quad x = \frac{A}{n}(2d + 5q)$$

Q13. (C) Given ratio 3 : 5 of boys and girls. Total number of students in the class is 24.

$$\text{Number of boys} = \frac{3}{8} \times 24 = 9 \text{ boys}$$

$$\text{Number of girls} = \frac{5}{8} \times 24 = 15 \text{ girls}$$

In order to have same number of boys and girls, 6 additional boys would have to enroll.

Q14. (B) This is a direct proportion, because the more sugar, the more flour

$$\frac{13}{18} = \frac{10}{x}$$

$$13x = 180$$

$$\Rightarrow x = 13\frac{11}{13}$$

Q15. (A)

The ratio 3 : 5 gives (3 + 5) = 8 parts

$$\text{Blue paints} = \frac{3}{8} \times 40 = 15 \text{ litres}$$

$$\text{Yellow paints} = \frac{5}{8} \times 40 = 25 \text{ litres}$$

Multiple Choice Questions (MCQs)

Q1. If 15 men can weave 120 meters of cloth in a day, how many meters of cloth can be woven by 35 men in a day?

(A) 135 m (B) 146 m

(C) 128 m (D) 168 m

Q2. If two items cost c cents, how many items can be purchased for x cents?

(A) $\frac{x}{2c}$ (B) $\frac{2c}{x}$

(C) $\frac{2x}{c}$ (D) $\frac{cx}{2}$

Q3. If four cows produce 4 cans of milk in 4 days, how many days does it take to produce 8 cans of milk?

(A) 1 (B) 2

(C) 4 (D) 8

Q4. To ride a ferry, the total cost T is 50 cents for the car and driver and c cents for each additional passenger in the car. What is the total cost for a car with n persons in the automobile?

(A) $T = n + c$ (B) $T = 50 + nc$

(C) $T = cn$ (D) $T = 50 + c(n - 1)$

Q5. Park, Jack and Galvin distributed price money of x dollars among themselves. Park received 3/10 of what Jack and Galvin together received. Jack received 3/11 of what Park and Galvin together received. What is the ratio of the amount received by Park to the amount received by Jack?

(A) 7 : 8 (B) 8 : 7
(C) 10 : 11 (D) 14 : 13

Q6. If a copier makes 3 copies every 4 seconds, then continuous at this rate, how many minutes will it take to make 9000 copies?

(A) 60 (B) 100
(C) 120 (D) 200

Q7. A hat company ships its hats, individually wrapped, in 8-inch by 10-inch by 12-inch boxes. Each hat is valued at $7.50. If the company's latest order required a truck with at least 288,000 cubic inches of storage space in which to ship the hats in their boxes, what was the minimum value of the order?

(A) $960 (B) $1350
(C) $2250 (D) $2050

Q8. Asim's Taxi Service charges an initial fee of $ 2.25 at the beginning of a trip and an additional charge of $ 0.35 for each $\frac{2}{5}$ of a mile traveled. What is the total charge for a trip of 3.6 miles?

(A) $ 3.15 (B) $ 5.40
(C) $ 4.80 (D) $ 5.05

Q9. If Scott has earned x dollars by working 3 days a week at a constant daily rate for w weeks, which of the following represent his daily wage?

(A) $\frac{x}{3w}$ (B) $\frac{w}{3x}$
(C) $\frac{3w}{x}$ (D) $\frac{xw}{3}$

Q10. If Finn was 18-month old one year ago, how old was he in months, x months ago?

(A) $x - 30$ (B) $30 - x$
(C) $x - 12$ (D) $24 - x$

Explanatory Answers

Q1. (D) Cloth woven by 25 men = 120 m

Cloth woven by 1 man = $\left(\frac{120}{25}\right)$ m

Cloth woven by 35 men = $\left(\frac{120}{25} \times 35\right)$ m

$= \frac{24}{5} \times 35 = 24 \times 7$

$= 168$ m

Correct answer is choice D.

2. (C) Items purchased for c cents = 2

Items purchased for one cent = $\frac{2}{c}$

Items purchased for x cent = $\frac{2}{c} \times x$

$= \frac{2x}{c}$

Correct answer is choice C.

(D) Four cows produce one can of milk in one day. Therefore, eight cows could produce two cans of milk in one day. In four days, eight cows will be able to produce eight cans of milk.

Q4. (D) Since, the driver's fee is paid with the car, the charge for $n-1$ persons $= c(n-1)$ cents; cost of car and driver $= 50$ cents. Therefore, $T = 50 + c(n-1)$.

Q5. (D) Let the amount received by Park, Jack and Galvin be P, J and G respectively. Since, the prize money, x, was distributed to Park, Jack and Galvin, the amount that Jack and Galvin together received equal $x -$ (the amount received by Park) $= 120 - P$.

Since, we are given that Park received $\frac{3}{10}$ of what Jack and Galvin together received, we have the equation.

$$P = \left(\frac{3}{10}\right)(x-P)$$

$$P + \frac{3P}{10} = \frac{3x}{10}$$

$$\frac{13P}{10} = \frac{3x}{10}$$

$$P = \left(\frac{3}{10} \times \frac{10}{13}\right) \times x$$

$$P = \frac{3x}{13}$$

Similarly, we are given that Jack received $\frac{3}{11}$ of what Park and Galvin together received $(x-J)$. We have the equation

$$J = \left(\frac{3}{11}\right)(x-J)$$

$$\Rightarrow \quad J = \frac{3x}{14}$$

Now $\quad P : J = \frac{3x}{13} : \frac{3x}{14}$

$$= 14 : 13$$

Hence, correct answer is choice D.

Q6. (D) At 3 copies every 4 seconds, the copier will finish the batch in (9000/3) × 4 seconds, or 12000 seconds. There are 60 seconds in a minute. So,

$$\frac{12000}{60} = 200 \text{ minutes}$$

Q7. (C) An 8 × 10 × 12-inch box contains 960 cubic inches-288000 total cubic inches divided by 960 cubic inches per box equals 300 boxes. 300 boxes times \$7.50 per hat equals \$ 2250.

Q8. (B) 3.6 miles divided by 2/5 equals 9, so the total charge is \$ 2.25 + (9 × \$ 0.35) = \$ 5.40.

Q9. (A) His daily wage can be determined by dividing his total income by the total number of days he has worked. x is his income, and $3w$ is the total number of days he has worked, so $\frac{x}{3w}$ is his daily wage.

Q10. (B) If Finn was 18-month old 1 year ago, then he is now $18 + 12 = 30$ months old, $30 - x$ represent his age x months ago.

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Average

In Mathematics, average is a representative of a number of given quantities. Average is of several kinds.

METHOD OF FINDING AVERAGE

To find average of any number of quantities of the same kind is to add all the items together and then divide the sum by the number of items.

$$\therefore \quad \text{Average} = \frac{\text{Sum of all the items}}{\text{No. of items}}$$

Model Examples

Example : The average daily temperature from 9^{th} January to 16^{th} January (both inclusive) was 38.6° and that from the 10^{th} to 17^{th} January (inclusive) was 39.2°. What was the temperature on 17^{th} January?

Solution: Total temp. from 9^{th} Jan. to 16^{th} Jan.

$= 38.6 \times 8°C$

$= 308.8°C$

Since the temp. on 9^{th} $= 34.6°C$

$\therefore$ Total temp. from 10^{th} Jan. to 16 Jan.

$= 308.8 - 34.6$

$= 274.2°C$

Total temp. from 10 to 17^{th} Jan.

$= 39.2 \times 8°C$

$= 313.6°C$

$\therefore$ Temp on 17^{th} Jan. $= 313.6 - 274.2$

$= 39.4°C$

Multiple Choice Questions (MCQs)

Q1. The average of even integers from 2 to 100 inclusive is:

(A) 49 (B) 52
(C) 51 (D) 50

Q2. What is the average of first hundred natural numbers?

(A) 50 (B) 50.5
(C) 49.5 (D) 100

Q3. What is the average of x, y and z? If $x + y = 5$, $y + z = 8$ and $x + z = 11$.

(A) $\frac{11}{3}$ (B) $\frac{1}{2}$
(C) $\frac{13}{5}$ (D) 4

Q4. The average of five numbers is 54. If three of the numbers are 26, 28 and 30, what is the average of the other two?

(A) 91 (B) 93
(C) 54 (D) 186

Q5. Which of the following is the average of $x^2 - 16$, $39 - x^2$ and $3x + 10$?

(A) $x + 3$ (B) $2x + 13$
(C) $x + 11$ (D) $\frac{x+11}{3}$

Q6. 8 students in a class obtained 60%, 3 obtained 75%, 2 obtained 80% and 7 obtained 45% in a class test. What is the average marks?

(A) 49% (B) 59%
(C) 29% (D) 51%

Q7. The average number of goals a team has scored in 7 matches is 8. They averaged 10 goals for the first 3 matches and they scored 5 goals in each of the next two matches. What is the average score of the last two matches?

(A) 5 goals (B) 4 goals
(C) 6 goals (D) 8 goals

Q8. If the mean (average) of 6 numbers is 4.5. What is the sum of the numbers?

(A) 0.75 (B) 10.5
(C) 12 (D) 27

Q9. A worker is paid R rupees per hour for the first 8 hours daily. For every hour

after the first 8 hours, she is paid S rupees per hour. If she works 12 hours in one day, what is her average hourly for the day?

(A) 8R + S (B) $\frac{8R + 4S}{4}$

(C) $\frac{12R - 8S}{4}$ (D) $\frac{2R + S}{3}$

Q10. Asim had an average of 60 on his first four math tests. After taking the next test, his average dropped to 58. Find his recent test grade.

(A) 40 (B) 50

(C) 48 (D) 32

Q11. If a + b = 8, b + c = 9, and c + a = 11, what is the average of a, b and c?

(A) $\frac{14}{3}$ (B) $\frac{28}{3}$

(C) $\frac{14}{6}$ (D) $\frac{7}{3}$

Q12. If the average of 3, 5, 10 and S is 6, what is the value of S?

(A) 4 (B) 6

(C) 12 (D) 0

Q13. What is the average of 3^{10}, 3^{20} and 3^{30}?

(A) 3^{59} (B) $3^9 + 3^{19} + 3^{[illegible]}$

(C) 3^{57} (D) $3^{11} + 3^{21} + 3^{[illegible]}$

Q14. If 20x + 20y = 70, what is the average of x and y?

(A) $\frac{7}{2}$ (B) 7

(C) $\frac{7}{4}$ (D) $\frac{4}{7}$

Q15. Which of the following is the average of $x^4 - 20$, $40 - x^4$, and $3x + 4$?

(A) $x^4 - 24$ (B) $x + 8$

(C) $x^4 + 3x + 24$ (D) $x + 24$

Explanatory Answers

Q1. (C) As sum of the first n even numbers $= n(n+1)$

Now, the sum of even numbers from 2 to 100 is

$2 + 4 + 6 + 8 + \ldots\ldots + 100$ (or 50 even number)

$= 50(50 + 1) = 2550$

$$\text{Average} = \frac{\text{Sum of numbers}}{\text{Number of terms}}$$

$$= \frac{2550}{50} = 51$$

Q2. (B) The first 100 natural numbers are $\{1, 2, 3, \ldots\ldots, 100\}$

Now, sum of all the first n numbers $= \frac{n(n+1)}{2}$

$$\text{Sum of first 100 natural numbers} = \frac{100(100+1)}{2}$$

$$= 5050$$

$$\text{Now, average} = \frac{\text{Sum of numbers}}{\text{Number of terms}}$$

$$= \frac{5050}{100} = 50.5$$

> ***Short-cut:*** The average of first "n" natural number is $\frac{n+1}{2}$.
>
> Thus, average $= \frac{100 + 1}{2} = \frac{101}{2} = 50.5$

Q3. (D) Adding the given three equations:

$$(x + y) + (y + z) + (z + x) = 5 + 8 + 11$$

$$2x + 2y + 2z = 24$$

$$2(x + y + z) = 24$$

Dividing both sides by 2

$$x+y+z = 12$$

Now average of x, y and z is

$$\frac{x+y+z}{3} = \frac{12}{3} = 4$$

Q4. (B) Let the missing numbers be a and b, then by given condition,

$$\frac{a+b+26+28+30}{5} = 54$$

$a+b+84 = 270$ (Multiplying both sides by 5)

$a+b = 186$

Hence average of a and b is

$$\frac{a+b}{2} = \frac{186}{2} = 93$$

Q5. (C) Average $= \dfrac{\text{Sum of the terms}}{\text{No. of terms}}$

$$= \frac{x^2-16+39-x^2+3x+10}{3}$$

$$= x+11$$

Q6. (B) 8 students with 60%, total = 480 marks

3 students with 75%, total = 225 marks

2 students with 80%, total = 160 marks

7 students with 45%, total = 315 marks

∴ 20 students obtain a total = 1180 marks

$$\therefore \text{Average} = \frac{1180}{20} = 59\%$$

Q7. (D) Total goals for 7 matches $= 7 \times 8 = 56$

Total goals for 3 matches with average score of $10 = 30$

Total goals for 2 matches with average score of $5 = 10$

∴ Total goals for remaining 2 matches $= 56 - 30 - 10$

$= 16$

Average goals in last two matches $= \dfrac{16}{2}$

$= 8$ goals

Q8. (D) Average of 6 numbers $= \dfrac{\text{Sum of numbers}}{6}$

⇒ Sum of the numbers = (Average of 6 numbers) × 6

$= 4.5 \times 6 = 27$

Q9. (D)

For first 8 hours, she is paid = 8R

Next 4 hours, she is paid = (12 − 8) = 4S

Total pay = 8R + 4S

$$\text{Average} = \frac{8R+4S}{12} = \boxed{\frac{2R+S}{3}}$$

Q10. (B) Let "x" be the required grade, then

$$\frac{4(60)+x}{5} = 58$$

$$\Rightarrow \quad 240+x = 290 \quad \Rightarrow x = 290-240 = 50$$

Q11. (A)

$$\frac{(a+b)+(b+c)+(c+a)}{3} = \frac{8+9+11}{3}$$

$$\Rightarrow \frac{2(a+b+c)}{3} = \frac{28}{3}$$

$$\Rightarrow a+b+c = 14 \quad \text{.........(i)}$$

Put $a+b = 8 \Rightarrow 8+c = 14 \Rightarrow \boxed{c=6}$

Now put $b+c = 9 \Rightarrow a+9 = 14 \Rightarrow \boxed{a=5}$

again put $c+a = 11 \Rightarrow 11+b = 14 \Rightarrow \boxed{b=3}$

Average of a, b and c $= \frac{6+5+3}{3} = \boxed{\frac{14}{3}}$

Q12. (B) $\frac{3+5+10+S}{4} = 6 \Rightarrow 18+S = 24 \Rightarrow \boxed{S=6}$

Q13. (B)

$$\frac{3^{10}+3^{20}+3^{30}}{3} = (3^{10}+3^{20}+3^{30})3^{-1}$$

$$= 3^{10-1}+3^{20-1}+3^{30-1}$$

$$= 3^{9}+3^{19}+3^{29}$$

Q14. (C) $20x+20y = 70 \Rightarrow 20(x+y) = 70 \Rightarrow x+y = \frac{7}{2}$

$\Rightarrow$ Average of x and y $= \frac{x+y}{2} = \frac{7}{2\times2} = \boxed{\frac{7}{4}}$

Q15. (B) $\frac{(x^4-20)+(40-x^4)+(3x+4)}{3} = \frac{3x+24}{3} = \frac{3(x+8)}{3}$

$$= x+8$$

Sequences & Serie[s]

Sequence: A sequence is an ordered list of numbers. The following is a sequence of even numbers:

2, 4, 6, 8, …

Term of a Sequence: A term of a sequence is identified by its position in the sequence. In the followin[g] sequence:

1, 3, 5, 7, …

1 is the first term, 3 is the second term, etc. The ellipses symbol (…) indicates that the sequence continue[s] forever.

Arithmetic Progressions: An arithmetic progression is a sequence in which the difference between an[y] two consecutive terms is the same. This is the same as saying; each term exceeds the previous term by a fixed amount. For example,

0, 4, 8, 12, …

is an arithmetic progression in which the common difference is 4.

The following sequence

−7, 0, 7, 14, 21,…

is arithmetic with a common difference of 7.

Finding the Sum of Arithmetic Sequence:

Since, each term of an arithmetic progression exceeds the previous term by a fixed amount. Therefore, we get the following:

First Term $a + 0d$
Second Term $a + 1d$
Third Term $a + 2d$
Fourth Term $a + 3d$
......
......
nth Term $a + (n - 1)d$

In above terms, a is the first term and d is the common difference. The formula generates the nth term. The sum of the first n terms of an arithmetic progression is:

$$S_n = \frac{n}{2}\{2a + (n-1)d\}$$

Example 1:

Find the next term in the series:

3, 9, 19, 33, 51, ...

Solution:

Write out the series of increments: 6, 10, 14, 18... (each term is the difference between two terms of the original series? This series is an A.P. whose next term is 22. Adding 22 to the term 51 from the original series produce the next term, 73.

Multiple Choice Questions (MCQs)

Q1. A sequence of numbers $a_1, a_2, a_3, \ldots, a_n$ is generated by the rule $a_{n+1} = 2a_n$. If $a_7 - a_6 = 96$, then what is the value of a_7?

(A) 98 (B) 198
(C) 192 (D) 92

Q2. The 9th term and common difference of an A.P. are –6 and $\frac{5}{4}$ respectively. The 25th term is:

(A) 21 (B) –18
(C) 14 (D) –21

Q3. The ratio of the 7th to the 3rd term of an A.P. is 12 : 5. Find the ratio of 13th to the 4th term:

(A) $\frac{3}{5}$ (B) $\frac{13}{10}$
(C) $\frac{10}{3}$ (D) $\frac{7}{10}$

Q4. The nth term of the sequence $a_1, a_2, a_3, \ldots, a_n$ is defined as $a_n = (a_{n-1})$. The first term $a_1 = -1$. What is the value of a_5?

(A) –1 (B) 1
(C) –2 (D) 2

Q5. If the 12th term of an A.P. is –13 and the sum of the first four terms is 24. Then, the sum of first 10 terms is:

(A) 0 (B) 1
(C) 5 (D) –5

Q6. The sum of the first n terms of a series is 31, and the sum of the first $n - 1$ terms of the series is 20. What is the value of nth term in the series?

(A) 8 (B) 10
(C) 18 (D) 19

Q7. In the sequence a_n, the nth term is defined as $(a_{n-1} - 1)^2$. If $a_1 = 4$, then what is the value of a_2?

(A) 7 (B) 5
(C) 6 (D) 9

Q8. The sequence of numbers a, ar, ar^2 and ar^3 are in Geometric Progression. The sum of the first four terms in the series is 5 times the sum of first two terms and $r \neq -1$. How many times larger is the fourth term than the second term?

(A) 4 (B) 6

(C) 5 (D) 8

Q9. The common ratio of a G.P. is $-\frac{4}{5}$ and the sum to infinity is $\frac{80}{9}$. Find the first term:

(A) 12 (B) 16
(C) 20 (D) 24

Q10. In a Geometric Progression, the first term is 7, the last term 448 and the sum 889. Find the common ratio:

(A) 6 (B) 4
(C) 3 (D) 2

Q11. A series has three numbers a, ar, and ar^2. In the series, the first term is twice the second term. What is the ratio of the sum of the first two terms to the sum of the last two terms in the series?

(A) 1 : 2 (B) 3 : 1
(C) 1 : 4 (D) 2 : 1

Explanatory Answers

Q1.(C) Substituting $n = 6$ in the given rule $a_{n+1} = 2a_n$

$$a_{6+1} = 2a_6$$

or $$a_7 = 2a_6$$

Also, given that

$$a_7 - a_6 = 96$$

$$a_7 - \frac{a_7}{2} = 96$$

$$\frac{a_7}{2} = 96$$

$$\Rightarrow \quad a_7 = 192$$

The correct answer is choice C.

Q2.(C) If a be the first term and d be the common difference of an A.P. Then

$$a_n = a + (n-1)d$$

$$a_9 = a + (9-1)d$$

$$a_9 = a + 8d$$

$$a_9 = a + 8 \times \frac{5}{4} \quad \Rightarrow \quad a_n = a + 10$$

$$-6 = a + 10 \quad \Rightarrow \quad a = -6 - 10$$

or $$\boxed{a = -16}$$

Now $$a_{25} = a + (25-1)d$$

$$= -16 + 24 \times \frac{5}{4}$$

$$= -16 + 30$$

$$\boxed{a_{25} = 14}$$

Correct answer is choice C.

3.(C) Let a be the first term and d the common difference of the A.P. Then

$$\frac{a+6d}{a+2d} = \frac{12}{5} \quad \Rightarrow \quad 5(a+6d) = 12(a+2d)$$

$$\Rightarrow \quad 5a + 30d = 12a + 24d \quad \Rightarrow \quad 5a - 12a + 30d - 24d = 0$$

$$\Rightarrow \quad -7a + 6d = 0 \quad \Rightarrow \quad \boxed{a = \frac{6}{7}d}$$

Now, $\dfrac{13\text{th term}}{4\text{th term}} = \dfrac{a+12d}{a+3d} = \dfrac{\frac{6}{7}d+12d}{\frac{6}{7}d+3d}$

$= \dfrac{90}{27} = \dfrac{10}{3}$

Correct answer is choice C.

Q4.(A) The rule of the given sequence is

$$a_n = -(a_{n-1})$$

Putting $n = 2$ and 3 in the given sequence, we have

$a_2 = -(a_{2-1}) \Rightarrow a_2 = -a_1$

$\Rightarrow a_2 = -(-1) \Rightarrow a_2 = 1$

Now $a_3 = -(a_{3-1}) \Rightarrow a_3 = -a_2$

$\Rightarrow a_3 = -(1) \Rightarrow \boxed{a_3 = -1}$

Similarly, we get that each even numbered term equals 1 and each odd numbered term equals –1. Since a_5 is an odd numbered term, it equals –1. The correct answer is choice A.

Q5.(A) Let a be the first term and d be the common difference of the A.P.

Then nth term $= a + (n-1)d$

$\therefore \quad a_{12} = a + (12-1)d \Rightarrow a_{12} = a + 11d$

$\Rightarrow \quad -13 = a + 11d \quad \ldots(i)$

Now, $S_n = \dfrac{n}{2}\{2a + (n-1)d\}$

$S_4 = \dfrac{4}{2}\{2a + (4-1)d\}$

$S_n = 2(2a + 3d)$

$\Rightarrow \quad 24 = 2(2a + 3d)$

$\Rightarrow \quad 2a + 3d = 12 \quad \ldots(ii)$

Multiplying equation (i) by 2 and subtracting from (ii), we have

$2a + 3d = 12$

$2a + 22d = -26$

$- \quad - \quad +$

$-19d = 38$

$\Rightarrow \boxed{d = -2}$

Substituting the value of –2 in (ii), we have

$2a + 3(-2) = 12$

$2a - 6 = 12 \Rightarrow 2a = 18$

$\Rightarrow \boxed{a = 9}$

Now $S_{10} = \dfrac{n}{2}\{2a + (10-1)d\}$

$S_{10} = \dfrac{10}{2}\{2(9) + 9(-2)\}$

$S_{10} = 5(18 - 18) \Rightarrow \boxed{S_n = 0}$

Correct answer is choice A.

(B) (The sum of the first n terms of a series) = (The sum of the first $(n-1)$ term) + (The nth term)

Substituting the given values in the equation gives

$$31 = 21 + n\text{th term}$$
$\Rightarrow$ nth term $= 31 - 21$
$\Rightarrow$ nth term $= 10$

Correct answer is choice B.

Q7.(D) Given that

$$a_n = (a_{n-1} - 1)^2$$

Replacing n by 2, we have

$$a_2 = (a_{2-1} - 1)^2$$

$$a_2 = (a_1 - 1)^2 \quad \ldots(i)$$

Given that $a_1 = 4$

Putting the value of a_1 in (1), we have

$$a_2 = (4 - 1)^2$$

$$\boxed{a_2 = 9}$$

Correct answer is choice D.

Q8.(A) In the given progression, the sum of the first two terms is $a + ar$, and the sum of the first four ter is $a + ar + ar^2 + ar^3$. Since "the sum of the first four terms in the series is 5 times the sum of first two terms." Thus,

$$a + ar + ar^2 + ar^3 = 5(a + ar)$$

Divide both sides by $(a + ar)$

$$\frac{a + ar + ar^2 + ar^3}{(a + ar)} = \frac{5(a + ar)}{(a + ar)}$$

$$\frac{(a + ar) + r^2(a + ar)}{a + ar} = 5$$

$$\frac{(a + ar)(1 + r^2)}{a + ar} = 5$$

$$1 + r^2 = 5$$

$\Rightarrow$ $r^2 = 4$

Now, the fourth term is $ar^3/ar = 4$ times the second term.

Hence, correct answer is choice A.

Q9.(B) The sum to infinity, $S_\infty = \dfrac{a}{1 - r}$

$$\therefore \quad \frac{80}{9} = \frac{a}{1 - \left(\frac{-4}{5}\right)}$$

$$= \frac{a}{\frac{5+4}{5}}$$

$$\Rightarrow \frac{80}{9} = \frac{a}{\frac{9}{5}} \quad \Rightarrow \frac{80}{9} = a \times \frac{5}{9}$$

$$\Rightarrow 80 = 5a \quad \Rightarrow \boxed{a = 16}$$

Hence, the first term of the geometric progression is 16.

Q10.(D) Here, $a = 7$, $\ell = a_n = 448$, $S_n = 889$

Let r be the common ratio

$$S_n = \frac{a(1-r^n)}{1-r}$$

$$= \frac{a-\ell r}{1-r} \quad \Rightarrow \quad 889 = \frac{7-448r}{1-r}$$

$\Rightarrow \quad 889(1-r) = 7-448r$

$\Rightarrow \quad 889 - 889r = 7-448r$

$\Rightarrow \quad 889 - 7 = 889r - 448r$

$\Rightarrow \quad 882 = 441r$

$\Rightarrow \quad r = \frac{882}{441}$

$\Rightarrow \quad r = 2$

Hence, correct answer is choice D.

Q11.(D) Since, the first term in the series is twice the second term, we have $a = 2(ar)$.

$\Rightarrow \quad 1 = 2r \quad \Rightarrow \quad \boxed{r = \frac{1}{2}}$

The three numbers a, ar, ar^2 becomes a, $a(1/2)$, and $a(1/2)^2$ or $a, \frac{a}{2}, \frac{a}{4}$.

Now, The sum of the first two terms $= a + \frac{a}{2}$

The sum of the last two terms $= \frac{a}{2} + \frac{a}{4}$

Setting ratio $\dfrac{a+\frac{a}{2}}{\frac{a}{2}+\frac{a}{4}}$

$$= \frac{\frac{2a+a}{2}}{\frac{2a+a}{4}} = \frac{\frac{3a}{2}}{\frac{3a}{4}}$$

$$= \frac{3a}{2} \times \frac{4}{3a}$$

$$= \frac{2}{1} \quad \text{or} \quad 2:1$$

Hence, correct answer is choice D.

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Zakat

'Zakat' is paid by a person who is Sahib-e-Nisab under Islamic principles @ 2.50% per annum on his saving in monetary terms, gold and silver and tradeable goods according to the set principles of Islam.

Q.1. What is the amount of Zakat payable by a person who saves Rs. 13500?

Sol.

Amount of Zakat @ 2 1/2% $= \frac{5}{200} \times 13500$

$= \text{Rs. } 337.5$

Q.2. What is the amount saved if Rs. 187.50 is paid as Zakat?

Sol.

Zakat payable $= 2\frac{1}{2}\%$ of one's savings

$\therefore$ Zakat paid on savings $= \text{Rs. } 187.50$

$\therefore$ Saving $= \text{Rs. } 187.50 \div \frac{5}{200}$

$= \text{Rs. } 187.50 \times \frac{200}{5}$

$= \text{Rs. } 7500.00$

Q.3. At a rate of $2\frac{1}{2}\%$ p.a. (per annum) how much Zakat will be paid on a wealth of Rs. 150850?

Sol.

Wealth $= \text{Rs. } 150850$

Rate of Zakat $= 2\frac{1}{2}\%$

Amount of Zakat payable $= \frac{5}{2} \times \frac{150850}{100} = \text{Rs. } 3771.25$

Q.4. Find the amount of Zakat paid by Zakir at a rate of $2\frac{1}{2}\%$ p.a. on his wealth value at Rs. 89,000.

Sol.

Wealth $= \text{Rs. } 89{,}000.00$

Rate of Zakat $= 2\frac{1}{2}\%$

Amount of Zakat payable $= \frac{5}{2} \times \frac{89000}{100} = \text{Rs. } 2225$

Q.5. Mukhtar's wife had a jewellery valued at Rs. 295000. Find the amount of Zakat payable at a rate of $2\frac{1}{2}\%$ p.a.?

Sol.

Wealth $= \text{Rs. } 295000$

Rate of Zakat $= 2\frac{1}{2}\%$

Amount of Zakat payable $= \frac{5}{2} \times \frac{295000}{100} = \text{Rs. } 7375$

Q.6. A man paid Zakat of Rs. 312.50 at the rate of $2\frac{1}{2}\%$ of his wealth. What is the value of his wealth?

Sol.

$$\text{Zakat paid} = \text{Rs. } 312.50$$

$$\text{Rate of Zakat} = 2\frac{1}{2}\%$$

$$\text{Value of wealth} = ?$$

$$2\frac{1}{2}\% \text{ of wealth} = \text{Rs. } 312.50$$

$$\text{or } \frac{5}{200} \times \text{wealth} = \text{Rs. } 312.50$$

$$\text{or wealth} = \text{Rs. } \frac{312.50 \times 200}{5}$$

$$\text{Required value of wealth} = \text{Rs. } 12{,}500$$

Q.7. Ijaz paid Zakat of Rs. 3705 at $2\frac{1}{2}\%$ p.a. Find the value of his wealth.

Sol.

$$\text{Wealth} = \text{Rs. } 3705$$

$$\text{Rate of Zakat} = 2\frac{1}{2}\%$$

$$\text{Value of wealth} = ?$$

$$\frac{5}{2}\% \text{ of value} = 3705 \text{ or } \frac{5}{2} \times \frac{1}{100} \text{ of wealth} = \text{Rs. } 3705$$

$$\text{or wealth} = 3705 \times \frac{200}{5} = \text{Rs.}148200$$

Q.8. A man has to pay Zakat on a wealth of Rs. 7,500 at the rate of $2\frac{1}{2}\%$. Find how much Zakat will he have to pay?

Sol.

$$\text{Wealth} = \text{Rs. } 7{,}500$$

$$\text{Rate of Zakat} = 2\frac{1}{2}\%$$

$$\text{Amount of Zakat} = 2\frac{1}{2}\% \text{ of Rs. } 7{,}500$$

$$= \frac{5}{2} \times \frac{7500}{100}$$

$$= \text{Rs. } 187.50$$

Word Problems

Multiple Choice Questions (MCQs)

Q1. **If 5 is subtracted from a certain number, the result is 7 less than twice the number. What is the number?**

(A) 2 (B) $\frac{1}{2}$
(C) 5 (D) 6

Q2. **Three times the first of three consecutive odd integers is 3 more than twice the third. What is the third integer?**

(A) 11 (B) 12
(C) 15 (D) 13

Q3. **Two-fifth of a certain number is 30. What is the number?**

(A) 75 (B) 25
(C) 90 (D) 150

Q4. **Saira weights 25 pounds more than Umbar. If together they weigh 205 pounds, what is the weight of Saira?**

(A) 90 (B) 105
(C) 115 (D) 135

Q5. **If the sum of two numbers is 36, and the larger is three times as larger as the smaller, what is the larger number?**

(A) 27 (B) 30
(C) 15 (D) 18

Q6. **The sum of integers p and q is 352. The units digits of p is 0. If p is divided by 10, the result is equal to q, what is the value of p?**

(A) 30 (B) 230
(C) 320 (D) 32

Q7. **A soap factory has 30 packers. Each packer can load $\frac{1}{8}$ of a box in 9 minutes. How many boxes can be loaded in $1\frac{1}{2}$ hours by all 20 packers?**

(A) 28 (B) $37\frac{1}{2}$
(C) 35 (D) $35\frac{1}{2}$

Q8. **Uzma is 15 years old. Asma is one-third older than Uzma. How many years ago when Asma was twice as old as Uzma is?**

(A) 5 (B) 12
(C) 15 (D) 10

Q9. **Moeed is now three times Mohsin's age. Four years from now, Moeed will be y years old. In terms of y, how old will Mohsin be?**

(A) $\frac{x-4}{3}$ (B) $\frac{x+4}{3}$
(C) $x+4$ (D) $x-4$

Q10. **If the sum of one-third of a number and twice the same number is 28, the number is:**

(A) 10 (B) 12
(C) 28 (D) 14

Q11. **A man's present age is x years. If his age in 8 years will be $\frac{4}{5}$ of what it will be in 20 years, then his present age is:**

(A) 45 (B) 25
(C) 30 (D) 40

Q12. **When 42 is added to twice a number, the result is 346, the number is:**

(A) 304 (B) 242
(C) 152 (D) 265

Q13. **A man was 26 years old when his daughter was born. Now, he is three times as old as his daughter. How many years old is the daughter now?**

(A) 13 years (B) 22 years
(C) 15 years (D) 12 years

Q14. **13 years ago Shabbir's mother was 7 times as old as he was. She is now 48 years old. How many years old is Shabbir now?**

(A) 28 (B) 18
(C) 38 (D) 20

Q15. **If 5 years are added to a man's present age and that age is tripled, he will be 84. What is his present age?**

(A) 18 (B) 23
(C) 32 (D) 54

Explanatory Answers

Q1. (A) Let the required number be x. Then $x-5=2x-7$

$\Rightarrow$ $\boxed{x=2}$. Thus the correct answer is 2.

Q2. (C) Let x = first integer

$x+2$ = second integer

$x+4$ = third integer

$3(x) = 3+2(x+4)$

$3x = 3+2x+8$

$x = 11$

Third integer is $(x+4) = \boxed{15}$

Q3. (A) Let the number $= x$, then

$\frac{2}{5}x = 30$

$\Rightarrow \quad x = \frac{30\times 5}{2}$

$\Rightarrow \quad x = 75$

Q4. (C) Let the weight of Saira $= x$

and Umber's weight $= y$

$x-25 = y$

and $x+y = 205$

$\Rightarrow \quad x-y = 25$

$x+y = 205$

$2x = 230$

$x = \frac{230}{2} = 115$ pound

Q5. (A) Let the smaller number $= x$

Then the larger number $= 3x$

Now $3x+x = 36$

$4x = 36$

$x = 9$

The larger number is $36-9=27$

Q6. (C) $p+q = 352$ and $\frac{p}{10} = q \Rightarrow p = 10q$

$10q+q = 352 \Rightarrow 11q = 352 \Rightarrow q = 32$

Now $p+32 = 352 \Rightarrow \boxed{p=320}$

Q7. (B) 30 packers will load $30\times\frac{1}{8}$ or $\frac{30}{8}$ boxes in 9 minutes. There are 90 minutes in $1\frac{1}{2}$ hours. So the 30 packers will load $10\times\frac{30}{8}$ or $37\frac{1}{2}$ boxes in $1\frac{1}{2}$ hours.

Q8. (D) Asma is one-third older or $\frac{1}{3}\times 15 = 5$ years older. Let x be the age of Uzma and $x+5$ be Asma's age. When Asma was twice the age of Uzma, $2x = x+5$ or $x=5$. Uzma was 5 years old and Asma was $x=5$ or 10 years old, twice Uzma's age. Since Uzma is 15 years old now,

Uzma was 5 years old 10 years ago.

Q9. (A) Assume x for Moeed and y for Mohsin

x is three times y $\Rightarrow$ $x = 3y$

x in four years $\Rightarrow$ $x = x + 4$

$\Rightarrow x = 3y + 4$

$\Rightarrow x - 4 = 3y$

$\frac{x-4}{3} = y$

Q10. (B) Let x be the required number, then

$\frac{1}{3}x + 2x = 28$

$\Rightarrow x + 6x = 84$

$\Rightarrow 7x = 84$

$\Rightarrow \boxed{x = 12}$

Q11. (D) Present age $= x$

$x + 8 = \frac{4}{5}(x + 20)$

$5x + 40 = 4x + 80$

$5x - 4x = 80 - 40$

$\boxed{x = 40}$

Q12. (C) Let x be the required number, then

$2x + 42 = 346$

$\Rightarrow 2x = 304$

$\Rightarrow \boxed{x = 152}$

Q13. (A) Let x be the age of man and y be the age of his daughter

$x - 26 = y$ ....(1)

$x = 3y$ ....(2)

Substituting the value of x in (1),

$3y - 26 = y$

$2y = 26 \Rightarrow \boxed{y = 13}$

Q14. (B) Let x be the age of Shabbir

$7(x - 13) = 48 - 13$

$7(x - 13) = 35$

$x - 13 = 5$

$\boxed{x = 18}$

Q15. (B) Let x be the man's present age, then

$3(x + 5) = 84$

$\Rightarrow x + 5 = 28$

$\Rightarrow \boxed{x = 23}$

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